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EXAMINING THE HUMAN HEALTH IMPACTS OF GLOBAL WARMING

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

OCTOBER 23, 2007

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ONE HUNDRED TENTH CONGRESS
FIRST SESSION

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[1]Note: During the 110th Congress, Senator Craig Thomas, of Wyoming, passed away on June 4, 2007. Senator John Barrasso, of Wyoming, joined the committee on July 10, 2007.

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EXAMINING THE HUMAN HEALTH IMPACTS OF GLOBAL WARMING

TUESDAY, OCTOBER 23, 2007

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The full committee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Office Building, Hon. Barbara Boxer (chairman of the committee) presiding.

Present: Senators Boxer, Inhofe, Bond, Craig, Cardin, Whitehouse, and Barrasso.

STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. The hearing will come to order.

Because of our time constraints, I am going to reduce the time for Senators to 3 minutes for opening statements. If colleagues come in after we have begun the panel, they can work those opening statements into their questions.

Good morning everyone. We all know the threat of global warming. There may be differences on what is causing it, but today we are going to deal with those threats. The World Health Organization has estimated that human-induced changes in the earth's climate lead to at least three million cases of illness and more than 150,000 deaths a year.

We need to start at 4 minutes, so it should be 3:32 right now.

Global warming can affect public health in many ways. Increased temperatures due to global warming can cause more frequent and more severe heat waves, which can cause illness and even death. For example, the European heat wave of 2003 caused countless numbers of illnesses and claimed 35,000 lives. Leading scientists are telling us that if we have more extreme weather events like this, and as the planet warms, it is very likely to affect our health. I think Dr. Gerberding's written testimony certainly underscores that.

The WHO predicts that in my home State of California, heat-related deaths could more than double by 2100. As I mentioned, California, I just want everyone to think as positively as they can for the people affected by these raging fires and for the emergency workers and particularly firefighters who are putting their lives on the line.

Scientists from the World Health Organization, the EPA, and the IPCC are also concerned that global warming may contribute to the spread of certain mosquito-borne diseases like malaria. It could

help spread certain viruses and other disease-causing organisms to new areas.

Global warming also might contribute to an increase in water-borne diseases including cholera, which causes severe diarrhea. Drought can cause the spread of water-borne diseases by wiping out supplies of safe drinking water and concentrating pollution. Floods can fuel water-borne illnesses as well. They wash sewage and other sources of pathogens into supplies of drinking water.

We are beginning to see what happens when water warms. The Associated Press reported on September 28, and I ask unanimous consent to place that story in the record. Without objection.

[The referenced document was not available at time of print.]

Senator BOXER. They reported that a 14-year-old boy died from an infection caused by an amoeba after diving in Lake Havasu. According to a CDC official, and I am going to ask you about that Dr. Gerberding, these amoebas thrive in warm water, and as water temperatures continue to rise, we can expect to see more cases of these amoeba infections.

The world is changing. Global warming is expected to cause an increase of ground-level ozone or smog because more ozone is formed at higher temperatures. Smog damages lungs and can cause asthma in children. It can cause premature death, especially in vulnerable people.

Our public health systems are already overburdened. Global warming will place tremendous new demands on public health officials. That is why we are having this hearing today. As Sir Nicholas Stern, former chief economist at the World Bank tells us, every dollar we spend today to reduce our greenhouse gas emissions would save $5 later. Certainly, as we look at the array of diseases I have just mentioned, that is clear.

We are beginning to take action here in Congress with a bipartisan breakthrough in this Committee, and we are going to deal with all of these issues.

I would like to welcome all our witnesses today, including Dr. Gerberding, Director of the CDC; Dr. Frumkin of the National Center for Environmental Health; Dr. McCally for Physicians for Social Responsibility; Susan Cooper from the Tennessee Department of Health and Dr. Roberts from the Uniformed Services University of the Health Sciences.

I thank you all for being here today. Your testimony will make an important contribution to this record as we proceed.

So although I said 3 minutes, it turned out to be 4 minutes per colleague, so let's get going.

Senator Inhofe.

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Madam Chairman.

First of all, let me say that I am glad tomorrow we are finally having a Subcommittee hearing on actually legislation. We have had so many hearings on global warming and all these things, but not on any particular piece of legislation. So I am looking forward to the Warner–Lieberman legislation. I really believe, Madam

Chairman, that we should really give this a long, deliberative hearing, several hearings, to get into all the details.

In addressing today's hearing, I will say that it appears the issue of health and global warming, like so many areas, has fallen prey to politics. Reducing issues such as malaria to a simple and naive view that higher temperatures equal higher malaria rates is not only simple, but simply wrong. Temperatures area factor, but it is also true that malaria can spread where it is relatively colder.

According to Paul Reiter of the Pasteur Institute in testimony before the Senate Commerce Committee last year, he said, "The most catastrophic epidemic on record anywhere in the world occurred in the Soviet Union"—he is talking about malaria—"the 1920s with a peak incidence of 13 million cases per year and 600,000 deaths." You don't think of the Soviet Union as being a hotbed of malaria, but certainly it was.

More important than temperatures are preventive measures and economic standards of living which, make no mistake, will be worsened by rash action to pass costly symbolic measures.

As we will hear today, when you look beyond the rhetoric at the facts, malaria is very much a disease that we can greatly diminish or help flourish, depending on how we live and what policies we put into place.

The facts are this: malaria was nearly wiped out a few decades ago by the use of DDT. This was not disputed. The disease now claims one million lives or more every year; again, not disputed. Regardless of the science of DDT, and it appears it did not support a ban, selective spraying can greatly diminish cases of malaria.

It was only recently, after millions of deaths, that policies began to shift away from alarmism and toward the genuine concern for the people who were paying for the alarmism with their lives. Let's not let history repeat again.

Madam Chairman, we have our markup in the Senate Armed Services that is taking place up in the sterile room upstairs, S–407, so I will have to be up there. It is required attendance, but I am glad we are ably represented here with logic to my right.

Thank you.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Madame Chairman, I am concerned that this Committee is not focusing on what it should—to deliberate legislation. We have had hearing after hearing after hearing on what people think about global warming or what might happen if we have global warming. But little on what will happen if we legislate global warming. As of October 23rd, we have not had a single legislative hearing on any of the major bills.

Tomorrow at the Subcommittee level, under the leadership of Chairman Lieberman, we will hold the first legislative hearing on a global warming bill. I commend Senators Warner and Lieberman for their hard work in crafting a bill and for holding tomorrow's legislative hearing. But tomorrow's hearing represents what should be the first step in the process, not the only step.

A single hearing that receives testimony from a single witness expressing concerns about the bill—held a mere six days after introduction—falls far short of a considered and deliberative process. There has been no time to analyze the text of this bill, or for members of the Committee to obtain input from stakeholders concerned about how the bill will impact them, or for economists to model its impacts on the competitiveness of the American economy.

Yet I understand there will be a markup next week of the bill. There is concern, Madame Chairman, that the full Committee examination will be even less sub-

stantive, even less deliberative. It is my hope that you will commit to conducting a thoughtful process similar to that which has been conducted in the past on major bills, providing us with specifics.

In addressing today's hearing, I will say that it appears the issue of health and global warming, like so many areas, has fallen prey to politics. Reducing issues such as malaria to a simple and naive view that higher temperatures equal higher malaria rates is not only simple, but simply wrong. Temperatures are a factor, but it is also true that malaria can spread when and where it is relatively colder. According to Paul Reiter of the Pasteur Institute in testimony before the Senate Commerce Committee last year:

"The most catastrophic epidemic on record anywhere in the world occurred in the Soviet Union in the 1920s, with a peak incidence of 13 million cases per year, and 600,000 deaths."

More important than temperatures are preventative measures and economic standards of living, which—make no mistake—will be worsened by rash action to pass costly symbolic measures. As we will hear today, when you look beyond the rhetoric at the facts, malaria is very much a disease that we can greatly diminish or help flourish, depending on how we live and what policies we put into place.

The facts are this: malaria was nearly wiped out a few decades ago by the use of DDT. This is not disputed. The disease now claims one million lives or more every year—again, not disputed. Regardless of the science of DDT—and it appears it did not support a ban—selective spraying can greatly diminish cases of malaria. But it was only recently, after millions of deaths, that policies began to shift away from alarmism and toward a genuine concern for the people who were paying for that alarmism with their lives. Let us not repeat history here.

Thank you.

Senator BOXER. Logic always resides from your point of view on the right.

[Laughter.]

Senator BOXER. Senator Barrasso, welcome.

Senator BARRASSO. Thank you very much.

Senator INHOFE. [Remark made off microphone].

Senator BOXER. We agree that that is how you view it. Yes.

STATEMENT OF HON. JOHN BARRASSO, U.S. SENATOR FROM THE STATE OF WYOMING

Senator BARRASSO. Thank you very much, Madam Chairman.

My thoughts and prayers are with the folks of your home State today, the rescue workers, the firefighters and the residents.

I am looking forward to this hearing this morning because for the last 20 years I have been doing television reports in my home State of Wyoming on preventable causes of diseases, giving people information that they can use to stay healthy, to keep down the cost of their medical care, and things they can do in prevention. That is people washing their hands and staying active and exercising more and eating less, getting adequate sleep. There are so many current day health problems that we need to deal with, such as malnutrition, HIV, potential issues with bird flu.

What I am always doing is trying to seek that balance on how we can focus our resources and attention today on current day preventable problems, and at the same time looking for ways to prevent problems and help protect people in the future.

So I am looking forward to today's hearings. Thank you very much, Madam Chair.

Senator BOXER. Thank you so much.

I believe, Senator Bond, you were next.

STATEMENT OF HON. CHRISTOPHER S. BOND, U.S. SENATOR FROM THE STATE OF MISSOURI

Senator BOND. Thank you very much, Madam Chair.

I did move up. Normally I sit in the cheap seats, and I thought maybe with smaller attendance today I would be able to see what everybody else looked like. I second what my colleague who does agree with what Dr. Barrasso said about present day health problems. Obesity is something we are very much concerned about as well.

I join with him in seeing the horrendous fires. We have friends out in California who have been driven from their homes. We want to provide any support we can, perhaps even from the Midwest. I know you are very short. We have crews that are willing to travel.

I appreciate your holding the hearing today on the health effects of climate change. We often focus on the size of ice caps, some of them increasing and some of them decreasing; the number of glaciers or the health of polar bears, and some of those are increasing in population.

But I think we also have to focus on the health of our families. Witnesses in testimony today I understand will focus on the health impacts of climate change, but there is something vital that is very missing in these considerations. The problem is not a single witness is expected to speak a single word on the specific health impacts that could result from the implementation of the proposed Lieberman–Warner carbon bill.

Now, I don't believe there is any assurance that that is going to make any difference in global warming or climate change, at least not in the foreseeable future. But no one is asking will a solution we consider in Lieberman–Warner inflict more harm upon the American people than the things we are trying to avoid. It is hard to tell since the Committee will spend almost no time considering the details of the legislation it will mark up.

As you know, several of us have shared with this Committee in a letter our severe misgivings about acting upon legislation which will receive almost no independent expert review or analysis. Given the chance, we might ask health experts about the health effects on fixed-income seniors, of going without prescription drugs because they must instead pay for higher power and gasoline bills under Lieberman–Warner.

What are the long-term effects of going without heart medication, blood pressure medication, or pain medication? Fixed-income seniors under Lieberman–Warner will have to choose between paying their air conditioning bills to survive oppressive heat and rationing their medication.

What are the health tradeoffs? How about low-income families? What are the long-term effects on nutrition? Higher heating and gasoline bills will force some families to choose whether to heat or eat? We saw that in Kansas City. Demand at food banks skyrocketed during our last recession and energy price run-up. Is not enough food good for health? Is not enough food good for childhood development?

The amount of help for low-income families that will trickle down from Lieberman–Warner seems woefully inadequate. Initial estimates find us taking the allowances that bill provides times 18 per-

cent for the number of allowances auctioned, times 20 percent for the number of auction allowances devoted to energy assistance, times 50 percent for the proceeds devoted to boost the LIHEAP program. Not surprisingly in a bill written by Northeasterners and East Coasters, supported primarily by Northeastern Coasters and West Coasters, they use a LIHEAP program formula which favors the Northeast in its heating problems.

Unfortunately, Missouri's share of the LIHEAP program is only 2 percent, with no funds going to alleviate high summer air conditioning costs. That means that Missouri low-income families suffering with higher power bills will receive .02 percent of the auction proceeds.

Madam Chair, I ask that the remainder of my statement be included in the record, and I appreciate the opportunity to raise the concerns of my constituents.

[The prepared statement of Senator Bond follows:]

STATEMENT OF CHRISTOPHER S. BOND, U.S. SENATOR FROM THE STATE MISSOURI

Madame Chairman, thank you for holding this hearing today on the health effects of climate change. While often the focus is on the size of ice caps, the number of glaciers or the health of polar bears, we also must focus on the health of our families. Witnesses and testimony today will focus on the health impacts of climate change, but something vital is still missing.

The problem is, not a single witness is expected to speak a single word on the specific health effects resulting from implementation of the proposed Lieberman-Warner carbon bill. No one is asking, will the solution we consider inflict more harm upon the American people then the thing we are trying to avoid?

It is hard to tell since the Committee will spend almost no time considering the details of the legislation it will mark up. As you know, several of us shared with you in a letter our severe misgivings about acting upon legislation which will have received almost no independent expert review or analysis.

Given the chance, we might ask a health expert about the health effects on fixed-income seniors of going without prescription medication because they must instead pay for higher power and gasoline bills under Lieberman-Warner.

What are the long term effects of going without heart medication, blood pressure medication, or pain medication? Fixed-income seniors under Lieberman-Warner will have to choose between paying their air conditioning bills to survive oppressive heat and rationing their medication. What are the health tradeoffs of that?

How about low-income families? What are the long term health effects of poor nutrition? Higher heating and gasoline bills will force some families to chose whether to heat or eat. We saw that in Kansas City—demand at food banks sky-rocketed during our last recession and energy price runup. Is not enough food good for health? Is not enough food good for childhood development?

The amount of help for low-income families that will trickle down from the Lieberman-Warner carbon auction scheme seems woefully inadequate. Initial estimates find us taking the allowances Lieberman-Warner provides, times 18 percent for the number of allowances auctioned, times 20 percent for the number of auction allowances devoted to energy assistance, times 50 percent for the proceeds devoted to boost the LIHEAP program.

Not surprisingly, in a bill written by Northeasterners and East Coasters supported primarily by Northeasterners and East Coasters, they use the LIHEAP program formula which favors the Northeast and its heating problems. Unfortunately, Missouri's share of the LIHEAP program is only 2.2 percent, with no funds going to alleviate high summer air conditioning bills.

That means, after all that figuring including a carbon price at $20 per ton, Missouri low-income families suffering with higher power bills will receive $^{2}/_{10}$ of a percent of the auction proceeds, or approximately $329 for each person in the Missouri LIHEAP program.

There are a couple of other pathways for helping low-income families, such as the set-aside for states, but there is no guarantee that states will use their share on low-income relief or instead for other authorized activities such as energy efficiency.

We also know that LIHEAP reaches only 1 in 6 families in need. Even if Lieberman-Warner proceeds double LIHEAP funding, 2 in 3 low-income families who cannot afford their energy bills now will be hit with even higher energy bills.

A recent study found that low-income families such as those earning less than $16,000 per year under plans to reduce emissions by 15 percent would face $750 to $1,000 in higher utilities bills. Of course, Lieberman-Warner wants to cut emissions by 70 percent. There are estimates out there saying this will cost several thousand dollars per family. How will a few hundred dollars in auction assistance funds make up for several thousand dollars in higher energy costs?

And so I ask again, what will be the cost of hundreds or even thousands of dollars in lost medication? or lost meals? or lost winter nights with no heat? or lost summer days without air conditioning? These are some of the health effects questions I would like answered before we vote on this legislation. Thank you.

Estimate of Lieberman-Warner Energy Assistance Funding for Missouri

	2012
Total Allowances Sec. 1201(d), p. 30.	5,200,000,000
Total Allowances Auctioned (18 percent in 2012) Sec. 3201, p. 86.	936,000,000
Energy Assistance Allowances from Auction (20 percent) Sec. 4302(b)(2), p. 123.	187,200,000
Energy Assistance Proceeds (at $20/ton)	$3,744,000,000
LIHEAP Portion of Energy Assistance Proceeds (50 percent) Sec. 4501(1), p. 137.	$1,872,000,000
MO Share of LIHEAP Proceeds (2.2 percent) ''The LIHEAP Investment'', 2/07, p.8.	$41,184,000
MO LIHEAP Recipients	125,000
LIHEAP Energy Assistance Auction Proceeds per MO LIHEAP Recipient.	$329

Senator BOXER. Senator, and you have done that every time, which is good. I mean, I hope you will vote for LIHEAP when it comes up because I have a couple of——

Senator BOND. [Remark made off microphone].

Senator BOXER. Well, I have a couple of votes where you did not, but we will talk about it, but you bring it up every time, and I think it is important for you to look at the record here because I will work with you, absolutely.

I think what is important here is to straighten the record out on a couple of points. Number one, thank you so much for your offer of help. It is so important right now for California. So I know we have differences on climate change, but there is no difference in helping each other when our States are in trouble.

Right now, we are down 50 percent in terms of our National Guard equipment because they are all in Iraq, the equipment, half of the equipment. So we really will need help. I think all of our States are down in terms of equipment.

Senator BOND. Well, Senator Leahy and I on the National Guard Caucus will welcome your help because the Guard has traditionally been underfunded when Iraq started, Katrina hit. The Guard had only one third of the equipment it needs, and this is a battle we fight with the Pentagon, and our colleagues have been most helpful.

Senator BOXER. That is another area where we can work together. It think it is good for people to see it. I have joined your caucus several months ago, and I am really ready to go because we have a letter that states from the Pentagon themselves that if

there is a real major catastrophe such as the one we are having now, we are really in some kind of trouble. So thank you very much for that.

I also wanted to make sure everyone knows the schedule of hearings we are going to have before the bill Lieberman–Warner bill is marked up. We are going to have a hearing tomorrow on the Subcommittee level. Then we are going to have three hearings and two briefings before the Committee marks up the full bill.

A lot of you have asked for that, and I agree with you 100 percent. I think what is important is that we do look at our vulnerable populations and what Lieberman–Warner has in store as far as helping them. So this we will do for sure.

I thank you very much again, everyone, for their kind offers and remarks.

Senator Craig.

STATEMENT OF HON. LARRY E. CRAIG, U.S. SENATOR FROM THE STATE OF IDAHO

Senator CRAIG. Madam Chairman, thank you, and thank you for what you have just said. A good number of us have approached you asking that we do a thorough examination of, with hearings on Lieberman–Warner, and it is important that we do so.

Because I serve on the Forestry Committee and have chaired it over time and ranked there and spend a lot of time looking at fire, let me empathize with you and California for just a moment. Our Fire Center in Idaho has deployed all of its equipment to you, and just a moment ago I was handed a note that the evacuation number has gone up to 320,000. It is very real and very dramatic.

I must tell you that we had one fire in Idaho this summer that was 600,000 acres. You are up to about 270,000 or 280,000 now. There is a very real difference, though. There weren't any homes in the area.

Senator BOXER. Right.

Senator CRAIG. There weren't any people structures.

But let me for just a moment talk about that because it is a part of what we ought be understanding when we look at the holistic approach to climate change. We burned about two million acres in Idaho this summer, the worst fire season we have had in decades. Nationwide, it is, with the fires now burning in California both in human structure loss and life loss and acreage burned, it may be worse than last year.

But Madam Chairman, here is an interesting statistic. When Senator Feinstein and I crafted Healthy Forests, you supported it, and I appreciate that a great deal. But because of the courts today, we are ineffective in doing the kind of urban wild-land interface cleaning that we should. In Southern California where the scrub oak grows rapidly and the thinning and the cleaning ought to occur, it hasn't for a lot of reasons, mostly environmental concerns by some special interest groups.

But here is an interesting statistic. If no public land fires had occurred in the United States this year, from a standpoint of carbon released into the atmosphere and greenhouse gases released into the atmosphere, it would have been equivalent to taking 12 million automobiles off the road.

Now, let's get real with ourselves. While we charge into the unknown, with legitimate concern, there are some known things we ought to be doing, and one of those areas is forest health. What happened in San Francisco on October 20 when we talked about the need to produce clean energy? The light got turned off for an hour. Is that the way we are going to solve our problems in the future with energy needs is simply turn off the lights?

I think Americans have spoken pretty clearly to that. In a communicative world which is extremely energy intensive today, I doubt we will be able to do that.

So for just a few moments, let me talk about four important principles that we ought to be incorporating in climate change, and I will spend a lot more time with Lieberman–Warner in doing that.

Senator BOXER. Senator, you have 40 seconds left. We are really going to try to get through.

Senator CRAIG. I will not err on the side of 40 seconds.

Let me suggest, though, that the New York Times recognized the goals of Lieberman and Warner, and said that they were impossible to achieve without nuclear power. I find it interesting that the 1970s rock relics are headed to the Hill today to talk about their anti-nuclear musician position. I find it interesting that we can't even get over the hurdles of the 1970s with the new technologies of today in our desire to create a cleaner world.

There is a combination of a lot of things happening out there, Madam Chairman, but right now in a very tragic and real way, as Idaho during August and September contributed to huge volumes of carbon into the atmosphere, California is now contributing in an unprecedented way, and that is tragic. We ought to be spending a lot of time looking at the broad cross-section of issues.

I ask unanimous consent that the balance of my statement be a part of the record.

Senator BOXER. Of course it will be.

Yes, the tragedy is the uncontrollable and unavoidable costs of these fires. Some of them actually could be stopped before they start because a lot of them are started by arsonists, as you know. They do contribute to the problem of global warming and that is why we have to be so careful, because even the steps we take may not be enough because of these other things.

Well, I want to welcome Dr. Gerberding here because I just want to praise your agency and this Administration for understanding that we already do know some things about what is happening out there with Global Warming and you are getting ready for it, and you don't view it as charging into the unknown, not after reading your statement.

So could you please take 5 minutes and then we will ask you some questions.

STATEMENT OF JULIE LOUISE GERBERDING, DIRECTOR, CENTERS FOR DISEASE CONTROL AND PREVENTION ACCOMPANIED BY: HOWARD FRUMKIN, DIRECTOR, NATIONAL CENTER FOR ENVIRONMENTAL HEALTH AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Dr. GERBERDING. Thank you.

It really is an honor to appear here. I must say I agree with what everyone has said this morning at the introductory level. I was in San Francisco at 8 o'clock on Saturday night and I found that hour of darkness to be very sobering and really a wonderful prelude to this hearing.

I have a graphic here to just remind you that while we are dealing with an extreme weather event in California, and indeed it is tragic, there are extreme weather events going on elsewhere in the Country including the drought in the Southeast that is affecting Atlanta, and the flooding in New Orleans today. So we are in an environment where increasingly CDC and other public health agencies are being asked to respond and prepare for these kinds of extreme events.

We need to do this in an environment of trying to change from really a climate of uncertainty to a climate of preparedness, preemption and planning. In order for that to happen, we do need to have some anticipatory understanding of what might be in store for us.

These are potential consequences of climate change that have been proposed by many, including scientists. These are recapitulated by the World Health Organization and the other UN organizations. But I think what is important here is that there are things here that we can reliably say we know will happen. There are things that are here that might happen, that we have some uncertainties about. And then there are things here that we just simply can't predict.

The one thing that I think is irrefutable is the fact that weather is inextricably linked to health. We see that in the kinds of weather events that occur every day. We see it seasonally with the relationship to influenza. We see it over years in the consequence of things like El Niño. I believe we will see this on a much longer time frame in the context of our changing climate.

So if we accept the fact that there is an important relationship between health and climate, then we need to concentrate on how we go about identifying what we can understand, predict, preempt, and prepare for.

One area where I think we have made the most progress is understanding how we would prepare for heat events. The catastrophe that occurred in Europe in 2003 should never happen again. Somewhere between 25,000 and 44,000 people were attributed to die from that terrible heat event. That, in this world in developed countries, should never be the case.

I am proud to say that the Environmental Protection Agency, together with FEMA, NOAA and CDC, have worked together in an interdependent manner to produce this guidance on how to avoid the consequences of excessive heat events. I think this is the kind of model for what needs to happen in government. We need to come together, bring our best science, collaborate on finding sensible solutions that are science-based, and if we don't have the science, to at least concentrate on using some common sense.

There is an important role for public health and for CDC in all of this. On this graphic, which I think you have in hand, I have listed many of the things that CDC and its public health partners in State and local governments would be responsible for doing. I

would like to highlight those areas that I think are the most relevant for conversation today.

One of those areas is the issue of health protection research. There is tragedy in not knowing what to do. We need to do the science to try to understand better the range of issues that may emerge with climate change. But an even greater tragedy is not doing what we know. I think we have plenty of examples there, where we need to apply the science and the knowledge that we do have in more creative ways.

CDC has two centers that are especially involved in this issue. One is our National Center for Environmental Health, and Dr. Howard Frumkin is sitting behind me who directs that Center. The other is our new center, the National Center for Zoonotic and Vector–Borne Diseases. Dr. Ali Khan is the Deputy of that Center. That Center is based on the premise that ecological infectious diseases are in our future for a number of reasons, including climate change, and the kind of health protection research that CDC needs to do in collaboration with its other partners really needs to focus in on these areas.

We have the infrastructure to make this happen. This is a graphic of some of our new laboratories, not just in Atlanta, but also in Puerto Rico and in Colorado, where this kind of science is being conducted today. I think we have a lot to contribute. We just need to bring everyone together, create an agenda, and forge ahead on solving some of these problems.

So I look forward to your questions, and again really appreciate the opportunity to shine a light on the health consequences of climate change.

Thank you.

[The prepared statement of Dr. Gerberding follows:]

STATEMENT OF JULIE L. GERBERDING, M.D., M.P.H., DIRECTOR, CENTERS FOR DISEASE CONTROL AND PREVENTION, ADMINISTRATOR, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

INTRODUCTION

Good morning Madam Chairwoman, Senator Inhofe, and other distinguished members of the Committee. It is a pleasure to appear before you as Director of the Centers for Disease Control and Prevention (CDC), the Nation's leading public health protection agency located within the Department of Health and Human Services. Thank you for the opportunity to present on climate change and human health and to highlight the role of CDC in preparing for and responding to the health effects of climate change.

BACKGROUND

The health of all individuals is influenced by the health of people, animals, and the environment around us. Many trends within this larger, interdependent ecologic system influence public health on a global scale, including climate change. The public health response to such trends requires a holistic understanding of disease and the various external factors influencing public health. It is within this larger context where the greatest challenges and opportunities for protecting and promoting public health occur.

PUBLIC HEALTH PREPAREDNESS FOR CLIMATE CHANGE

Climate change is anticipated to have a broad range of impacts on the health of Americans and the nation's public health infrastructure. As the nation's public health agency, CDC is uniquely poised to lead efforts to anticipate and respond to the health effects of climate change. Preparedness for the health consequences of climate change aligns with traditional public health contributions, and—like prepared-

ness for terrorism and pandemic influenza—reinforces the importance of a strong public health infrastructure. CDC's expertise and programs in the following areas provide the strong platform needed:

• *Environmental Public Health Tracking*—.CDC has a long history of tracking occurrence and trends in diseases and health outcomes. CDC is pioneering new ways to understand the impacts of environmental hazards on people's health. For example, CDC's Environmental Public Health Tracking Program has funded several states to build a health surveillance system that integrates environmental exposures and human health outcomes. This system, the Tracking Network, will go live in 2008, providing information on how health is affected by environmental hazards. The Tracking Network will contain critical data on the incidence, trends, and potential outbreaks of diseases, including those affected by climate change.

• *Surveillance of Water-borne, Food-borne, Vector-borne, and Zoonotic Diseases.*—CDC also has a long history of surveillance of infectious, zoonotic, and vector-borne diseases. Preparing for climate change will involve working closely with state and local partners to document whether potential changes in climate have an impact on infectious and other diseases and to use this information to help protect Americans from the potential change in of a variety of dangerous water-borne, food-borne, vector-borne, and zoonotic diseases. CDC has developed ArboNet, the national arthropod-borne viral disease tracking system. Currently, this system supports the nationwide West Nile virus surveillance system that links all 50 states and four large metropolitan areas to a central database that records and maps cases in humans and animals and would detect changes in real-time in the distribution and prevalence of cases of arthropod-borne viral diseases. CDC also supports the major foodborne surveillance and investigative networks of FoodNet and PulseNet which rapidly identify and provide detailed data on cases of foodborne illnesses, on the organisms that cause them, and on the foods that are the sources of infection. Altered weather patterns resulting from climate change may affect the distribution and incidence of food- and water-borne diseases, and these changes can be identified and tracked through PulseNet.

• *Geographic Information System (GIS).*—At the CDC, GIS technology has been applied in unique and powerful ways to a variety of public health issues. It has been used in data collection, mapping, and communication to respond to issues as wide-ranging and varied as the World Trade Center collapse, avian flu, SARS, and Rift Valley fever. In addition, GIS technology was used to map issues of importance during the CDC response to Hurricane Katrina. This technology represents an additional tool for the public health response to climate change.

• *Modeling.*—Model projections of future climate change can be used as inputs into models that assess the impact of climate change on public health. CDC has conducted heat stroke modeling for the city of Philadelphia to predict the most vulnerable populations at risk for hyperthermia. In light of these projections, CDC has initiated efforts to model the impact of heat waves on urban populations to identify those people most vulnerable to hyperthermia.

• *Preparedness Planning.*—Just as we prepare for terrorism and pandemic influenza, we should use these principles and prepare for health impacts from climate change. For example, to respond to the multiple threats posed by heat waves, the urban environment, and climate change, CDC scientists have focused prevention efforts on developing tools that local emergency planners and decision-makers can use to prepare for and respond to heat waves. In collaboration with other Federal partners, CDC participated in the development of an Excessive Heat Events Guidebook, which provides a comprehensive set of guiding principle and a menu of options for cities and localities to use in the development of Heat Response Plans. These plans clearly define specific roles and responsibilities of government and non-governmental organizations during heat waves. They identify local populations at increased high risk for heat-related illness and death and determine which strategies will be used to reach them during heat emergencies.

• *Training and Education of Public Health Professionals.*—Preparing for the health consequences of climate change requires that professionals have the skills required to conceptualize the impending threats, integrate a wide variety of public health and other data in surveillance activities, work closely with other agencies and sectors, and provide effective health communication for vulnerable populations regarding the evolving threat of climate change. CDC is holding a series of five workshops to further explore key dimensions of climate change and public health, including drinking water, heat waves, health communication, vector-borne illness, and vulnerable populations.

• *Health Protection Research.*—CDC can promote research to further elucidate the specific relationships between climate change and various health outcomes, including predictive models and evaluations of interventions. Research efforts can also

identify the magnitude of health effects and populations at greatest risk. For example, CDC has conducted research on the relationship between hantavirus pulmonary syndrome and rainfall, as well as research assessing the impact of climate variability and climate change on temperature-related morbidity and mortality. This information will help enable public health action to be targeted and will help determine the best methods of communicating risk. CDC can serve as a credible source of information on health risks and actions that individuals can take to reduce their risk. In addition, CDC has several state-of-the-art laboratories conducting research on such issues as chemicals and human exposure, radiological testing, and infectious diseases. This research capacity is an asset in working to more fully understand the health consequences of climate change.

• *Communication.*—CDC has expertise in communicating to the general public health and risk information, and has deployed this expertise in areas as diverse as smoking, HIV infection, and cancer screening. Effective communication can alert the public to health risks associated with climate change, and encourage constructive protective behaviors.

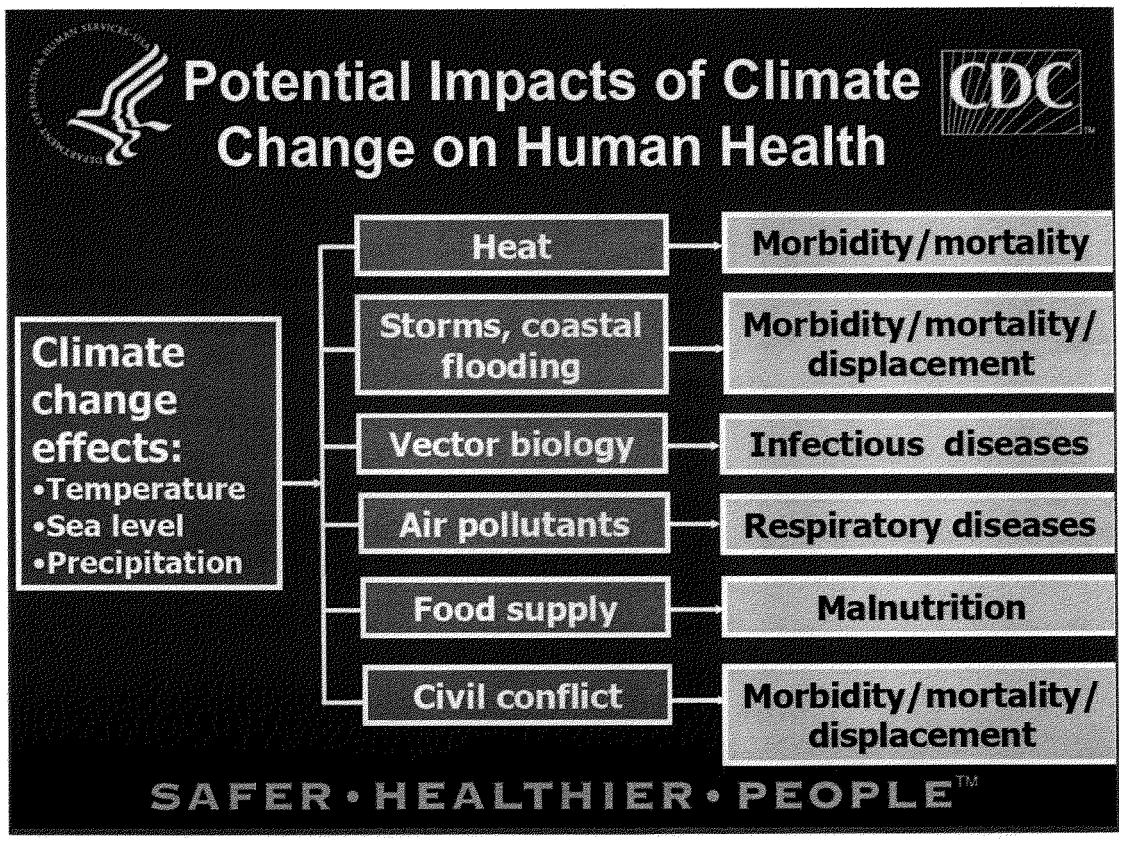
While CDC can offer technical support and expertise in these and other activities, much of this work needs to be carried out at the state and local level. For example, CDC can support climate change preparedness activities in public health agencies, and climate change and health research in universities, as is currently practiced for a variety of other health challenges.

CONCLUSION

An effective public health response to climate change can prevent injuries, illnesses, and death and enhance overall public health preparedness. Protecting Americans from adverse health effects of climate change directly correlates to CDC's four overarching Health Protection Goals of Healthy People in Every Stage of Life, Healthy People in Healthy Places, People Prepared for Emerging Health Threats, and Healthy People in a Healthy World.

While we still need more focus and emphasis on public health preparedness for climate change, many of our existing programs and scientific expertise provide a solid foundation to move forward. Many of the activities needed to protect Americans from adverse health effects of climate change are mutually beneficial for overall public health. In addition, health and the environment are closely linked. Because of this linkage it is also important that potential health effects of environmental solutions be fully considered.

Thank you again for the opportunity to provide this testimony on the potential health effects of global climate change and for your continued support of CDC's essential public health work.


Potential Impacts of Climate Change on Human Health
CDC
Climate change effects:
•Temperature
•Sea level
•Precipitation
Heat
Storms, coastal flooding
Vector biology
Air pollutants
Food supply
Civil conflict
Morbidity/mortality
Morbidity/mortality/ displacement
Infectious diseases
Respiratory diseases
Malnutrition
Morbidity/mortality/ displacement
SAFER • HEALTHIER • PEOPLE™

Senator BOXER. Thank you very much, Doctor.

You know, one of my colleagues, I think it was Senator Barrasso, said we have so many other issues—kids have to exercise, they have to watch their weight. I guess the implication is why look at this.

First of all, my own answer to his rhetorical comment, I am sure he didn't want me to answer it, is if we wait we could waste valuable time and people could be severely injured as a result.

The other thing is, you know, we tell our kids it is really important to exercise, to eat properly. Well, here is a kid who went into Lake Havasu and he went swimming. Kids are supposed to do that to stay healthy. I would assume, Senator Barrasso, you would agree with that. Well, what happened was he wound up in the hospital. It seemed like a headache, nothing more, but when painkillers and a trip to the emergency room didn't fix it, Aaron Evans, the 14-year-old, asked his dad if he was going to die. Oh, no, and then his father said, I come home and I am burying him.

Well, what happened is Aaron was exposed to an amoeba, a microscopic organism, and I don't pronounce it correctly, called naeglaria fowleri. Did I say that right?

Dr. GERBERDING. Well, I usually say naeglaria.

Senator BOXER. Naeglaria fowleri.

Dr. GERBERDING. Fowleri.

Senator BOXER. It attacks the body through the nasal cavity, quickly eating its way to the brain. The doctors said he probably picked it up a week before while swimming in Lake Havasu. They said such attacks are rare, though some health officials have put their communities on high alert, telling people to stay away from warm—warm—standing water.

Now, Michael Beach, who works in your shop, he is a specialist in recreational water-borne illness for the Centers for Disease Control and Prevention, said, "This is definitely something we need to track. This is a heat-loving amoeba. As water temperatures go up, it does better. In future decades as temperatures rise, we better expect to see more cases."

Do you agree with those comments?

Dr. GERBERDING. Well, I think what I agree with is that we need to find out the answer, and there are ways of monitoring for this organism and understanding how it does respond to the various changes in water temperature and other climatic effects, including salinity and the flocculants in the water.

Right now, this is a rare disease, but it is exactly the kind of thing that we are here to talk about. What are the uncertainties and where can we apply our knowledge to decrease some of the uncertainty as we look forward to ecological changes?

Senator BOXER. Now, Texas health officials are acting now. They are not waiting. They have issued a news release about the danger of amoeba attacks, telling people to be cautious around water. Are you doing anything at this stage at CDC?

Dr. GERBERDING. There are a number of things that we are doing related to water per se. This particular organism is a tiny part of the overall issue of water and health and climate change.

We anticipate many consequences of water. One of the exciting things that we are beginning to be able to do in 2008 is the track-

ing project, where we can relate climate to health outcomes, both chronic diseases that I know were already mentioned as an important here and now problem, but also potential future diseases that will emerge or re-emerge in this context.

Senator BOXER. Dr. Gerberding, I have a presentation by Michael McGeehan from the National Center for Environmental Health at CDC. Could we hold up that chart that says potential impacts? I just wonder if you agree with this. What he does is he shows heat, storms, coastal flooding, vector biology, air pollutants, food supply, civil conflict. Do you agree with this presentation, if global warming were to occur and we were not able to lessen its impact? Do you agree with that, that these are some of the problems that we could see on the orange?

Dr. GERBERDING. Absolutely. This is a list of potential things that you could realistically expect, and these are the areas where we want to focus our attention in terms of the ecological science, as well as the ability to predict and model where the events may occur.

I don't think in some of these areas it is a question of if. It is a question of who, what, where, when, how and how bad it will be.

Senator BOXER. Yes. Well, obviously, yes. A lot of us are trying to stop the worst effects by acting. A lot of others are putting their head in the sand and saying, oh, let's concentrate on our other problems; we can't even deal with those. I think we have to do both as Senators. You can't close your eyes to the future, and you can't close your eyes to the present.

Senator Barrasso, 4 minutes please.

Senator BARRASSO. Thank you very much, Madam Chairman.

I think this is a tragic case that you reflected upon. I think my initial comments talked about trying to find a balance of how we do the best we can today, and also trying to protect into the future, which I was so glad to hear about the organization within the Centers for Disease Control and Prevention, this health protection research effort that is going on and what we can do there.

I was just reading an article in Investors Business Daily, and this comes to try to find this balance. This was last week. It talks about Dr. William Gray, professor emeritus of the Atmospheric Department at Colorado State University. In the article, it says they found that $1 spent fighting HIV–AIDS produces $40 in social benefits; $1 spent in fighting malnutrition yields $30 in social benefits; but $1 fighting to lower CO_2 emissions yielded between 2 cents to 25 cents in benefits. It is trying to find that balance.

I want to know if you have any comments on how we can best use our limited resources?

Dr. GERBERDING. I am a scientist, not an economist. But I just read the Harvard Business Review this week from the October edition where they are presenting the issue of climate change to the corporate international communities, and really making a very strong business case that it is not just an issue of corporate social responsibility or philanthropy anymore. It is an issue of corporate survival and economic security for businesses.

So I think the broad dimension of sustainability and climate change and their intersection are things that we need to look at.

I hope in the hearings and the debates that go on about various legislation this will be an area that will come up.

As a public health official, I am always balancing the need to take care emerging or urgent reality today, and the need to do things like plan for pandemics or the health consequences of climate change. I think we have to be able to do both, but getting that responsible balance is part of what needs to be a very open debate. I agree that it should be a debate.

Senator BARRASSO. And then the other question is, we hear about the tragedy of what happened in Europe in the heat wave and all of those who perished. And then one reads reports that with any change in temperature, a degree rise or two, there are reports of the number of lives that have been saved by not having the cold impact and the deaths that are caused by cold and the cardiovascular impacts of the extreme cold. Any comments on that?

Dr. GERBERDING. There is better science now relating temperature and mortality rates, including a very large study done in the United States where this was looked at geographically and by various population subsets.

I think one of the things to say to help put the European experience in perspective that in none of that climate tracking data that went on over a long period of time was there ever an event where 25,000 people died from a winter storm. So what we are dealing with is not just the gradual increments in temperature that may be offset by less cold and more heat, but also these extreme events which are devastating, particularly to vulnerable people in our population.

So you have to look at the total impact, not just the stable reflection of temperature and health status. I think there is a lot of uncertainty there, and we need to really be looking at the past climate and anticipating what it means in terms of the future, and what we are seeing happening right now today in the United States.

Senator BARRASSO. Thank you very much. No further questions.

Senator BOXER. Thank you, Senator.

Senator Cardin, 4 minutes. We welcome you.

STATEMENT OF HON. BENJAMIN L. CARDIN, U.S. SENATOR FROM THE STATE OF MARYLAND

Senator CARDIN. Thank you, Chairman Boxer. I very much appreciate you holding this hearing. I think it is very important that this Committee explore the health impacts of global climate change. I would ask that my entire opening statement be made part of the record.

Senator BOXER. Without objection.

[The prepared statement of Senator Cardin follows:]

STATEMENT OF HON. BENJAMIN L. CARDIN, U.S. SENATOR FROM THE STATE OF MARYLAND

Madame Chairman: Thank you for holding this hearing today.

As the National Academies of Science noted just last month, "Our understanding of the impact of climate changes on human well-being and vulnerabilities is much less developed than our understanding of the natural climate system." Our current level of information gives us cause for grave concern. And common sense suggests that even greater health impacts are coming.

The extreme weather events that are expected to be among the first effects of global warming clearly present serious threats to human health and safety. And those events don't have to be as immediate as a deadly hurricane or tornado. They can also be prolonged periods of extreme heat, leading to the premature deaths of our most vulnerable citizens including the elderly.

Increases in global warming are also likely to result in increased levels of smog, which is a function of chemical pollution reacting in the presence of strong summer heat. Today more than 90 percent of all Marylanders live in ozone non-attainment areas. Global warming threatens progress being made on improving those numbers. The World Health Organization is predicting a 60 percent increase in ozone pollution in the eastern United States by 2050.

Algal blooms could occur more frequently as temperatures warm—particularly in areas with polluted water. Diseases that tend to accompany algal blooms could become more frequent. These are adverse health effects that are already upon us. Global warming will simply make them worse.

And that is just the beginning of the story. My greatest concerns are not about the health effects on Marylanders or even Americans. My greatest concerns have to do with the potential for widespread disease and dislocation that might accompany global warming in unstable parts of the world. Prolonged droughts can be expected to result in the spread of contagious diseases that will result from more people trying to use a declining water supply. The health impacts of global warming need to be more fully documented. We need better predictive models that can help us understand the likely health impacts of global warming in different parts of the world. We need better coordination among climate scientists, world health providers, and our national security and State Department officials.

Today's hearing is an especially timely one. We are starting to see the truly global health impacts associated with global climate change. Today's hearing should help us understand the current state of our knowledge. Today's hearing should also provide constructive ways in which we can better monitor, plan and protect our citizens and those around the world in future years.

I look forward to hearing from today's witnesses.

Thank you, Madame Chairman.

Senator CARDIN. Let me say, I could concentrate on the impact on my State of Maryland, the sea level changes and the impact that are going to have on health; the change of water temperature, which has an incredible impact on the environment in the State of Maryland.

I want to follow up on Senator Boxer's question on the global effects of climate change, whether it is heat or whether it is dealing with some of the changes of population, or whether it deals with the potential food supply or extreme weather conditions, and ask you whether there are efforts internationally which CDC is part of to try to get a common understanding of what is happening, so that we can develop an international strategy to deal with the potential changes of food supply, of population, of all those other issues that could have a major impact on the entire world, and whether CDC is playing a role in trying to get that type of collaboration internationally.

Dr. GERBERDING. We are playing a role. One specific example would relate to the President's Malaria Initiative where we are out trying to implement a program to reduce the deaths due to malaria by 50 percent. As part of that, of course, we are tracking malaria and will learn a lot about the effectiveness of our programs, as well as hopefully the influence of climate.

But I would say right now today, other than some collaborative work we are doing in conjunction with the World Health Organization, we are not really exhibiting leadership and doing as much as we should be doing. I think it is time for us to step forward and do some convening around these issues, and really contribute to an international agenda.

The World Health Organization has created a platform for the global health consequences of climate change, and there are some very specific goals and objectives in there that CDC really should and could contribute a great deal to.

One of the areas where we excel is in the area of surveillance, and our ability to relate human health issues with data that is being collected by other climate scientists and other agencies in other parts of the world is really a unique contribution that I think we can leverage things we are already doing quite well.

Another very important asset that we have is our ability to communicate. We have a Web site that was just voted the number one health Web site in the Nation. We are trying to globalize it so that it is more relevant and more reachable in other places that might want to be able to use our shared information.

So there are some specific things that we could do better right now, and then there are some things we would like to be able to do in the future.

Senator CARDIN. Well, I applaud you for your Web site. I expect that it is not only one of the top in our Country, but probably top in the world. CDC is looked upon internationally. I must tell you, at international meetings frequently CDC is mentioned as a standard that is important for the entire world.

Moving on malaria is important and I appreciate the leadership that you are applying there, and as you acknowledge, I think there is more that an organization such as CDC can do to sensitize the international community that we are all in this together. Malaria is important to attack internationally, as are other issues including perhaps change in food supply as a result of what is happening with global climate change, or dealing with sea level increases and what impact that is going to have internationally on concerns that we all share.

So I just would urge you to be as aggressive as you can on individual issues, individual health issues that are affected by climate change. But to start to develop the protocols that we are working in a more aggressive way so we have a common set of models that we can use so that we all can work together, rather than just one country dealing with it.

Thank you, Madam Chair.

Senator BOXER. Thank you, Senator.

The reason I am moving it along is we may have a vote as early as 11-ish.

So Senator Craig, go ahead.

Senator CRAIG. Madam Chairman, thank you very much.

I am not one of those who would suggest we ought to wait, because I think information and knowledge is power. And let me say, Dr. Gerberding, I will join with Senator Cardin in recognizing your Web site and the work you do.

Knowledge is power, and a lot of people don't have the knowledge to make the decisions they could make that are relatively practical that improve health situations. For example, we all know about this new superbug, MRSA. And yet on your Web site, you are very practical. It probably saves lives. It is wash your hands, shower after exercise, cover skin traumas with a bandage, don't share razors, and keep surfaces clean.

We are all creatures of habit, and habits are what we respond to daily. We don't want to change our habits unless we are forced to, or unless knowledge tells us we ought to. One of the things that you can do and you are doing is to be able to spread that practical knowledge that will change habits and normal everyday actions. So I don't think we ought to wait at all, Madam Chairman, on information and flow and understanding and sharing.

At a climate change conference in The Hague a good number of years ago, I got into an interesting debate with a professor from Bangladesh about sea rise. To him, it was a very practical problem. If the sea rises at all, his country is eliminated. It doesn't exist anymore. His people would simply have to pack up and leave, an entire nation, albeit small, but we know tremendously populated. A little different in the State of Maryland, with impacts, you bet. Real? You bet. But Maryland probably, with a few feet, doesn't disappear. Some of it might, but Bangladesh would. So it is a matter of perspective, and it is also a matter of reality.

One of the things I find out, Madam Chairman, when we talk about energy conservation, most people don't understand how to conserve, but if they are given a practical list of things they can do as a family, as a small economic unit in a large economic unit, it is amazing the kinds of savings that can occur if there are simply one or two less trips to the supermarket every week, because they organized a shopping list and went once instead of three times. Practical? Yes. Do they need to be instructed in it? In most instances, yes.

So while we are wrestling with the bigger issues and your work sometimes can be very practical, it becomes phenomenally important and it does save lives, and I want to thank you for the work you do.

Let me also react, and I think that Senator Barrasso touched on it, I think all of us were shocked by the number of deaths in Europe when that heat wave occurred. For those of us who have traveled in Europe, we find it interesting that there aren't any air conditioners. We have grown to know that they are just in every home in America today almost, but it is a cool area of the world and they never felt they needed it.

But I have seen studies that would suggest cold or a substantially colder temperature would produce a good deal more deaths and is more difficult to adjust to than heat. Are there any studies, or have you looked at that at the CDC to draw any conclusions about it?

Dr. GERBERDING. I think there have been some very excellent initial work that EPA has funded through some academic environments that are trying to understand this more clearly. One of the interesting observations is that the effect of temperature depends on what you are used to. So if you are used to living in a cold temperature, you are more tolerant of more cold, but less tolerant of more heat. If you are used to living in a warmer temperature, you have a harder time with cold, but you do a little bit better with the extremes of heat. So our biology and our ecology really intersect in some very interesting ways there.

What we don't know yet, other than the fact that these are particular problems for the elderly primarily because of the cardio-

vascular stress, we don't really know what the sub-population issues are. So there is a great deal more that will be learned through this kind of research.

Senator CRAIG. Thank you.

Senator BOXER. Thank you, Senator.

Senator CRAIG. Thank you, Madam Chairman.

Senator BOXER. Senator Whitehouse, 4 minutes please.

STATEMENT OF HON. SHELDON WHITEHOUSE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator WHITEHOUSE. Thank you, Madam Chair.

May I ask unanimous consent that my opening statement be put at the appropriate place in the record?

Thank you.

[The prepared statement of Senator Whitehouse follows:]

STATEMENT OF HON. SHELDON WHITEHOUSE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Madam Chairman, thank you for holding this important hearing today on the growing impact of global climate change on human health. I'm proud that our chairman has worked hard to move us past a debate over whether global warming in fact exists—as all scientists and the American people do not doubt that it does—and onto the critical question of what we do next.

As our chairman and many of my colleagues know, the solution to climate change cannot be limited to reducing the pollutants that caused it. That will help—but it's too late to ignore the need for a more comprehensive approach that considers global warming's impact on our environment, our wildlife, on every aspect of our society—and particularly on ourselves.

The threats to public health from global warming affect us all, and will continue to worsen the longer we delay speedy action to limit global warming pollution in the United States and around the world. Unfortunately, those who will bear the greatest burden are those least able to protect themselves, including our children, the elderly, and those without access to adequate medical care. I applaud the chairman for highlighting this important topic and look forward to working with her and my colleagues on the committee to pass strong legislation to significantly reduce our nation's contribution to global climate change.

We have already begun to see the effects of climate change on our health. Unfortunately, the degree of warming we have already experienced today is only a fraction of what we can expect in the future without decisive action to improve the quality of our air and water. Warmer temperatures stemming from rising levels of global warming pollution in the air have already been linked to increased "red alert" days in our cities from unhealthy levels of smog, and a resulting increase in asthma and other respiratory illnesses, especially in our youth and elderly. A recent report by researchers at Yale University concluded that many U.S. cities could see a doubling of unhealthy ozone days if global warming pollution is left unchecked. Such a change would have a far-reaching ripple effect on our quality of life, as fewer children and seniors could take part in outdoor recreation and other activities, and on our economy as well.

I am particularly troubled by the impact on our children, because they are not only one of the most vulnerable segments of our population, but because it is they who will have to live with the myriad of consequences from a warming world in the future. The environmental ministers from the G–8 nations emphasized this point in a unanimously approved declaration on children's environmental health, stating that "Children will be among the most susceptible to more severe heat waves, more intense air pollution, and the spread of infectious diseases. Future generations will face many potential impacts of climate change with serious health, environmental and economic consequences."

Before joining the Senate I was proud to serve on the board of Creating Healthy Environments for Children, now known as Healthy Child Healthy World, a group dedicated to protecting our children from harmful environmental threats. Their work is so important, but the federal government should be at the forefront of these efforts. Wherever possible, as we conduct further research on the effects of green-

house gas emissions and set policy regarding pollutant cuts, we should take special care to consider the impact on children.

Increases in unhealthy ozone and smog, however, are not the only dangers we face. Rising temperatures are also beginning to change disease patterns. Diseases carried by ticks and mosquitoes are spreading into new areas and scientists have warned that epidemics such as dengue fever and malaria may reemerge in the United States. If we allow this to continue the strain on our already overburdened public health system could be devastating.

Instances of extreme weather are also increasing and leading to more severe floods, storms, and extended heat and cold waves. We have seen the havoc wreaked by hurricanes Rita and Katrina on the homes, lives, and mental and physical health of the residents of the Gulf Coast—devastation they continue to fight and overcome today. Left unchecked, climate change will result in future storms of this magnitude for which we continue to be unprepared.

Madam Chairwoman, I am dedicating to working with you to address these challenges now, before they become worse. We have an obligation to respond to the overwhelming facts and scientific evidence pointing toward the need to take aggressive action now to limit the impact of global warming on our environment, our economy, and the health of our people.

Senator WHITEHOUSE. Doctor, I serve also on the Intelligence Committee. We spend a great deal of time looking at national security issues. I was wondering if you would mind talking a little bit about global warming and climate change in the context of United States national security, both in terms of direct impacts occurring within the geographic United States, and also indirect impacts from consequences that physically occur in other nations, but have ramifications for U.S. national security.

Dr. GERBERDING. I think I can address this generically and perhaps in more detail in another environment.

Senator WHITEHOUSE. Since we have 3 minutes and 10 seconds, I think we have to do it pretty generically here.

Dr. GERBERDING. I would say that, first of all, the two large areas where this would be most relevant are in the areas of food security and water security, because obviously the kinds of social disruption and the economic harms that can come about if those problems emerge in a particular location add to other factors that initiate ideologic conflict and/or other kinds of strife.

So we are mindful of the intersection between health, security and economics, and all we have to do is look at SARS to understand what a tremendous problem that one infectious disease outbreak really created. So it is a very interdependent process, and there absolutely are important security concerns that we can certainly speculate about and talk offline.

Senator WHITEHOUSE. Good. I appreciate it.

Senator BOXER. Thank you, sir. Thank you.

Well, you know, we are going to move on to our next panel, but I just have to say, Dr. Gerberding, that I found your presentation extremely important. I found your testimony very powerful. You are not into the politics of this. You are into helping people, and I think what you said today is very important. It is devoid of politics. What you are telling us is we better get ready for this and we better get ready for this now. I appreciate it very, very much. Thank you.

Dr. GERBERDING. Thank you. I appreciate the opportunity to be here and also to make a case for getting the science. I think that is exactly where we need to go. Thank you.

Senator BOXER. Absolutely. Thank you very much.

And now we are pleased to invite our next panel up. We have Dr. Michael McCally, M.D., Ph.D., Executive Director, Physicians for Social Responsibility; Susan Cooper, MSN, RN, Commissioner, Tennessee Department of Health; and Dr. Don Roberts, Professor Emeritus, Uniformed Services University of the Health Sciences.

We welcome you. It is my intent to move you along. We will give you 5 minutes. If you can go 4, that gives us more time for questions because we are going to have to stop this whole hearing because we think we have four votes in a row.

So let's get started. Dr. McCally, Physicians for Social Responsibility, welcome, sir.

STATEMENT OF MICHAEL McCALLY, EXECUTIVE DIRECTOR, PHYSICIANS FOR SOCIAL RESPONSIBILITY

Dr. McCALLY. Good morning and thank you.

I am Dr. Michael McCally. I am executive director of Physicians for Social Responsibility. I am pleased to join Dr. Gerberding and my other witnesses beside me on the subject of health and global warming. I will cut my remarks.

PSR and its 32,000 members believe that climate change is a global health crisis. In support of this position, I am pleased to provide the Committee today a growing list of very distinguished American physicians, including clinicians, professors from well-known medical schools, a former Governor, Nobel laureates, a former Surgeon General, all physicians, all have joined PSR in calling on this Committee and the Congress and the President to act on global warming and quickly put in place appropriate controls on greenhouse gas emissions.

I have also provided members of the Committee with a brief analysis that highlights human health impacts of global warming in the U.S., much in the fashion that Dr. Gerberding has just given us. I would very quickly cite just a few examples we have heard, and many of them, Madam Chairman, you covered them in your opening remarks.

We have already talked about here this morning the summer of 2003 record-breaking temperatures in Europe and the 35,000 lives that were lost. I would mention air quality, more than 100 million Americans live in areas where ozone levels exceed the U.S. EPA air quality standard. Rates of asthma, respiratory and related cardiovascular disease continues to rise. Global warming undermines efforts to improve air quality as rising temperatures accelerate ozone formation during summer months.

Finally, West Nile virus, not seen in this Country before 1999, and I was in New York and worked on the issue as the first manifestation of that issue appeared in that city. To date, more than 25,000 cases of West Nile virus have been reported across this Country and Canada, with more than 1,000 deaths.

I would just want to mention briefly the problems of the Western United States. In my home State of New Mexico, the wildfire season has grown by 78 days in the last three decades. The West has seen greater temperature rises than other parts of the United States. In some areas, temperatures have already risen on average by 2 °C over the past century, more than the global average of one half degee.

In coming decades, further rise in temperature will bring snows that melt sooner, shrinking snow pack, and threat to the stored water supply. It is predicted that water resources in the Colorado Basin will decline by 40 percent in this century.

So it seems to me that the science debate is over. There is scientific and increasingly a social consensus that we must act definitely to stabilize greenhouse emissions and to limit further temperature rise. To date, there has been no significant Federal action on global warming. As a scientist and a physician, as a citizen and as a grandparent, I find this inaction disturbing.

I have one more page.

We are passing responsibility for global warming to our children and our grandchildren. We need action now. Not all government is ineffective. In the absence of a Federal response, cities and States have taken action. There are now more than 290 American cities and 27 States working on climate action plans. These actions include efforts to improve the efficiency of vehicles, buildings, expand our use of renewable energy, and many of these projects tend carefully to the cost implications that have been raised this morning appropriately, and include green industrial development.

The medical community supports the assertions of our colleagues who serve on the Intergovernmental Panel on Climate Change. In order to reduce U.S. emissions to an acceptable level, we support mandatory controls on greenhouse gases that will reduce emission levels to a 1990 baseline by the end of the next decade, and an 80 percent reduction by the middle of the century.

Finally, to conclude, I do want to point out that physicians are beginning to consider the implications of global warming for clinical practice and for public health preparedness. They will need support and leadership from the CDC in particular in these new efforts. I would urge the Committee to understand that the Centers for Disease Control, and through it, State and local health departments, must be appropriately funded to respond adequately to global warming.

I thank you.

[The prepared statement of Dr. McCally follows:]

STATEMENT OF MICHAEL MCCALLY, M.D., PH.D., EXECUTIVE DIRECTOR OF PHYSICIANS FOR SOCIAL RESPONSIBILITY

Good morning, Madame Chair and members of the committee. I am Dr. Michael McCally, Executive Director of Physicians for Social Responsibility (PSR), and a medical school Professor of Community and Preventive Medicine. My field is environmental health. I am pleased to join Dr. Gerberding and Commissioner Cooper in testifying before the committee about the human health dimensions of global warming.

Managing global warming will be a long and protracted task. The U.S. must engage now and with the same level of effort we mounted to deal with previous global crises: two world wars and a cold war. As a leading emitter of greenhouse gases the United States must accept its share of the burden in solving this problem.

PSR and its 32,000 members believe climate change is a global health crisis. In support of this position I am pleased to provide to the committee today a list of 115 distinguished physicians that includes professors from 15 medical schools, a former governor, two Nobel Laureates and former Surgeon General David Satcher.

We continue to collect endorsers for these principles, which also are supported by the American Nurses Association, the American Public Health Association and the National Association of Pediatric Nurse Practitioners. Together, these groups represent more than 200,000 physicians, nurses and public health professionals. All have joined PSR in calling on this committee, the Congress and the president to act

on global warming and quickly put in place appropriate controls on greenhouse gas emissions.

Already, the World Health Organization estimates that 150,000 people die every year from effects of global warming. While those deaths may not be as apparent in the U.S. the impacts of global warming are pervasive and will shortly affect every citizen in this country in some manner.

I have provided all members of the committee with a brief analysis prepared by PSR that highlights the human health impacts of global warming in the U.S. Weather related events that cause death are not uncommon in the U.S.—it is the extremes and frequency of these events that will cause a mounting public health toll. Likewise, poor air quality is presently a problem in many areas of the country and will be exacerbated by rising temperatures.

Already we are seeing the symptoms of global warming in the form of heat waves, fires, flooding, hurricanes, drought and increases in pest and water borne diseases:

• The most recent report from the Intergovernmental Panel on Climate Change confirms that across the globe, including here in the United States, the frequency and duration of heat waves has increased over the last 50 years. In the summer of 2003, record breaking heat waves across Europe claimed an estimated 35,000 lives, tragically demonstrating the potentially disastrous public health consequences of a continued trend of increasingly frequent extreme heat events. Looking into the future, researchers estimate that Chicago will experience 25 percent more frequent heat waves with a business-as-usual scenario, while the number of annual heat wave days in Los Angeles will rise from 12 to between 44 and 95—the upper end of this range marking a 692 percent increase. Extreme heat, already the number one cause of weather-related deaths in the U.S., will become an increasing public health burden if global warming is left unmitigated.

• Although ambient air pollutant concentrations have generally fallen since passage of the 1970 Clean Air Act, more than 100 million Americans live in areas where ozone levels exceed the U.S. Environmental Protection Agency's 8-hour air quality standard and rates of asthma and other respiratory diseases continue to rise. Global warming will undermine efforts to improve air quality as rising temperatures accelerate ozone formation during summer months. A recent study published in the journal Climatic Change projects that across 50 U.S. cities, the number of unsafe air days—days when ozone levels exceed the U.S. Environmental Protection Agency's 8-hour air quality standard—will increase by 68 percent. The study also estimates that the number of unhealthy "red alert" days—days when everyone, young and old, healthy and infirm are advised to avoid prolonged outdoor exertion—is expected to more than double across these 50 cities. Here in the nation's capitol, the number of healthy air days during the summer months is expected to drop by 24 percent. Left unaddressed, rising ozone concentrations will cause serious respiratory and cardiovascular health problems in America's cities.

• West Nile Virus, virtually unseen in the U.S. as recently as 1999, has spread to 47 states as warmer winters and changing precipitation patterns allow conditions for an expansion of the mosquito population. To date, more than 25,000 cases of West Nile Virus have been reported across the country and more than 1,000 deaths have been recorded.

And, extreme weather events are increasing with results that are difficult to predict and prepare for. As an example, those of us in the medical community were frustrated and finally ashamed of the response to Hurricane Katrina. Hundreds of people received inadequate or no health care at all. As a result, many unnecessary deaths occurred and hundreds of others were left sick without sanitation or clean water supplies. And, as the public health fallout of Katrina demonstrated, it is the poor and disadvantaged who are likely to suffer the most. They have more difficulty escaping the heat, are more frequently exposed to the elements and have less access to health care.

As scientists and physicians we must examine the evidence and look for solutions, treatments if you will. Medicine is based on notions of prevention. We devise treatment plans or solutions with an aim of cure. But, those things that we cannot cure we must work to prevent—certainly that is the case with global warming. The medical community supports the assertions of our colleagues who serve on the Intergovernmental Panel on Climate Change. In order to reduce U.S. emissions to an acceptable level, we support mandatory controls on greenhouse gases that will reduce emission levels to the 1990 baseline by the end of the next decade and then lead to an 80 percent reduction by the middle of the century.

In my home state of New Mexico scientists believe that global warming is leading to more heat, less snow and more wildfires. The West has seen larger temperature increases than any other part of the United States. In some areas temperatures

have already risen by 2 degrees C over the past century, much more than the average change globally of +0.5 degrees C.

Warming clearly is present in the Southwest. In New Mexico the wildfire season has grown by 78 days during the past three decades. Fire is a significant and costly public health and economic problem. In coming decades further rise in temperature will bring later snows that melt sooner, shrinking the snow pack and stored water. One study predicts that water resources in the Colorado basin will decline by 40 percent in the century.

There is scientific and increasingly social consensus that we must act quickly and definitively to stabilize greenhouse gas pollution and to limit further temperature rise. To date there has been no significant federal action on global warming. As a scientist and physician, as a citizen and as a grandparent I find this inaction unconscionable. We are passing responsibility for global warming to our children and grandchildren. The administration has failed to address global warming, and the Congress should feel an extra sense of responsibility.

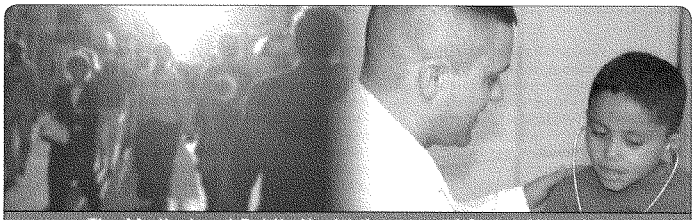
Not all government is ineffective. In the absence of a federal response cities and states have taken action. There are now 290 American cities and 27 states working on climate action plans. These actions include efforts to improve the efficiency of our vehicles and our buildings and to expand our use of renewable energy from the wind and the sun.

Finally, the U.S. medical and public health community as you have heard this morning is not prepared for multiple, large scale disasters that will manifest themselves as a result of climate change. Preparedness is a new medical and public health mission for which we are not adequately funded. I would urge the committee to understand that the Centers for Disease Control—and through it state and local health departments—must receive the funds necessary to respond appropriately to the challenges we will face as a result of global warming.

That concludes my testimony, and I will be glad to answer any questions from the committee.

The Medical and Public Health Impacts of Global Warming

A FACTSHEET FROM PHYSICIANS FOR SOCIAL RESPONSIBILITY



The Medical and Public Health Impacts of Global Warming

A Warming World

As scientific evidence continues to mount that the earth's climate is rapidly changing, it is clear that global warming is no longer just a prediction.

Rising oceans, stronger hurricanes, prolonged droughts, and more intense heat waves are signs of the already discernable impacts that global warming is having worldwide. Global average surface temperatures have increased by about one degree Fahrenheit since the beginning of the 20th century,[1] and the five hottest years on record have all occurred within the last decade.[2] With the atmospheric concentration of carbon dioxide (CO_2) now higher than at any point in the last 420,000 years, widespread consensus within the scientific community points to the burning of fossil fuels as the primary cause of this warming of the planet.[3] Unless emissions of heat-trapping greenhouse gases are reduced, temperatures will increase by an additional 2.5 to 10.4 degrees Fahrenheit during the next 100 years—a rate likely to be without precedent in the last 10,000 years.[3]

Beyond the serious and potentially irreversible impacts on physical and biological systems,[4] a growing body of research also suggests that global warming will adversely affect public health in a number of important ways.

Heat-Related Illness

Climate models predict that North American heat waves will increase in intensity, frequency, and duration as global mean temperatures rise over the course of this century.[5] Under this scenario, the many health problems associated with exposure to extreme and prolonged heat—heat cramps, heat syncope (fainting), heat exhaustion, and heatstroke[6]—will become increasingly common. Heat acclimatization is possible, but in cases of extreme or chronic heat stress, the body's ability to shed heat through increased blood circulation and perspiration, and thus its ability to maintain temperature balance, is lost.[6] In such cases, death can result.

The 2003 European heat waves resulted in a surge of heat-related deaths. Across the United Kingdom, France, Italy, the Netherlands, Portugal, and Spain, the heat waves that occurred during the summer of 2003 are estimated to have caused at least 22,000 excess deaths, with some arguing that this figure could be revised upward by as much as an astounding 50–100 percent.[7]

In the United States, a seven-day (July14–20) heat wave in Chicago during the summer of 1995 resulted in 485 heat-related deaths.[8] In total, 739 excess deaths were reported during this period, representing a 147 percent increase above baseline levels.[8]

These figures demonstrate the potentially devastating impact that could result from an increase in heat wave frequency and intensity. Though heat waves normally affect broad geographic regions and resident populations, certain groups are particularly vulnerable. The very old and the very young tend to have reduced heat-regulating mechanisms and are at increased risk.[6] The poor, the socially isolated, and those already suffering from chronic illness also are likely to be disproportionately affected by an increase in heat wave frequency and severity.[6]

Air Pollution-Related Health Impacts

While both air pollutant emissions and ambient pollutant concentrations have generally fallen since passage of the 1970 Clean Air Act, as recently as 2002 approximately 146 million people in the United States lived in counties that did not meet air quality standards for at least one regulated pollutant.[9] Exposure to air pollution can aggravate chronic respiratory and cardiovascular disease, damage lung tissue, lead to premature

death, and may even contribute to cancer.[10] Global warming may exacerbate these problems by affecting the concentration, distribution, and type of both manmade and natural air pollutants.[10] Ozone levels, for example, are likely to increase because higher temperatures accelerate the rate at which ground-level ozone (the main component of smog) is formed.[10] While long-term exposure to ozone is linked to the development and exacerbation of chronic lung diseases, even short-term exposure to relatively low ozone concentrations can cause lung inflammation, acutely decreased lung function, and respiratory impairment.[10] A 2004 study using global warming and air quality models in the 31-county New York metropolitan region projected a median increase of ozone-related acute mortality across the region of 4.5 percent by the 2050s.[11]

Although increasing atmospheric CO_2 concentrations have no known direct adverse health effects, other byproducts of fossil fuel combustion, including airborne particulate matter (PM), sulfur oxides (SO_x), and nitrogen oxides (NO_x), are associated with a number of well-established health risks.[12] Consequently, a continued rise in CO_2 emissions would be mirrored by a rise in the harmful effects of these combustion byproducts.

In recognizing the link between CO_2 emissions and PM pollution, Cifuentes et al. estimated that adoption of existing, readily acquirable greenhouse gas mitigation technologies would reduce PM concentrations by 10 percent, thus avoiding 64,000 premature deaths and 65,000 chronic bronchitis cases through 2020 in four cities alone—New York City, USA; Santiago, Chile; Mexico City, Mexico; and São Paulo, Brazil.[13] These studies demonstrate that actions aimed at mitigating the atmospheric accumulation of greenhouse gases would have the additional benefit of reducing the adverse health effects associated with a range of air pollutants.

There also is growing evidence that rising global mean temperatures are impacting both the timing and abundance of airborne allergens, especially pollen.[14]

In recent decades, spring flowering, and thus the allergenic pollen season, has advanced at a rate of nearly a day per year.[15] In Europe, spring events such as leaf unfolding advanced by six days, while autumn events such as leaf coloring have been delayed by nearly five days in the last 35 years.[16] Experimental studies have demonstrated significant increases in pollen production resulting from exposure to increased CO_2 concentrations, while examination of recent trends have linked elevated pollen levels to increases in temperature.[14] Additionally, some studies suggest stronger allergenicity of pollen from trees grown at increased temperatures.[17] Patz, et al. warn of the potential public health consequences of these changes: "climate change may adversely impact the occurrence and severity of asthma, the most common chronic disease of childhood, and affect the timing or duration of seasonal allergies such as hay fever."[14] Combined with the observed doubling of pediatric asthma prevalence within the past twenty years,[18] children's physiological and behavioral susceptibility to air pollution increases their risk of being adversely affected by changes in the concentration and distribution of pollutants.[19]

Infectious Disease

Since 1976 the world has witnessed not only the emergence of 30 diseases previously unknown to medicine, but also the resurgence of older diseases such as malaria and cholera, and

Forebodings from the Gulf Coast

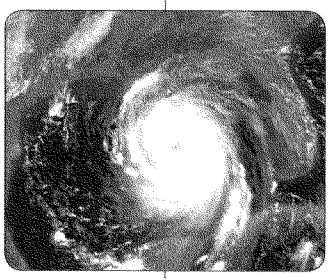
The devastation produced by Hurricanes Katrina and Rita along the Alabama, Mississippi, and Louisiana coasts has given new urgency to the threats posed by global warming. Although Hurricane Katrina cannot be specifically attributed to global warming, recent trends point to a shift toward more intense storms.

As tropical ocean sea surface temperatures (SSTs) continue to rise—SSTs increased 0.5 degrees Celsius during the last 35 years[20]—warmer ocean temperatures will increase the total energy available to amplify storm intensity. According to a study published in the journal *Science*, during the past 35 years the number of hurricanes reaching categories 4 and 5 has nearly doubled in both number and proportion.[21] Other investigators have concluded that "the potential destructiveness of hurricanes... has increased markedly since the mid-1970s," warning that "future warming may lead to an upward trend in tropical cyclone destructive potential."

Already, more than 1,200 deaths have been reported as a result of Katrina.[22] Public health and rescue workers also have documented numerous cases of respiratory and diarrheal disease among evacuees and rescue workers. The long-term public health effects of the storm, however, remain uncertain though considerable. Of particular concern are the health threats associated with exposure to molds in flood damaged structures and the risk posed by the toxic residues left behind from the flooding of chemical facilities and oil refineries along the 100 mile stretch between Baton Rouge and New Orleans known as "Cancer Alley."

the redistribution of others, including West Nile virus.[15] While not all of these changes in infectious disease transmission patterns are related to global warming, Paul Epstein, MD, of Harvard Medical School's Center for Health and the Global Environment has warned that "a warming and unstable climate is playing an ever-increasing role in driving this global emergence, resurgence, and redistribution of infectious diseases."[20] Furthermore, in a 2003 report on climate change and human health, the World Health Organization (WHO) concluded that "changes in infectious disease transmission patterns are a likely major consequence of climate change."[21]

Vector-borne diseases result from infections transmitted to humans primarily by blood feeding arthropods such as mosquitoes, ticks, and fleas.[22] Most vector-borne diseases exhibit a distinct seasonal pattern, with weather variables such as temperature and rainfall affecting both the vectors and the disease-causing pathogens they transmit.[23] Mosquitoes, for example, are very sensitive to temperature changes.[24] Higher temperature increases their rate of reproduction, the number of blood meals they take, prolongs their breeding season, and shortens the maturation period for the pathogens they carry.[24] Rising global temperatures could also result in the expansion of vector ranges into areas with previously unexposed populations.[14] The 1999 outbreak of West Nile virus (WNV) in New York in which seven people died,[20] and the subsequent expansion of the disease in the summer of 2002, when 230 animal species were infected and cases of human or animal WNV were reported in 44 states and the District of Columbia,[24] exemplify what may occur more regularly as global warming progresses.



Extreme Weather Events and Water-Related Health Impacts

Evidence indicates that extreme weather events such as heavy precipitation, floods, droughts, and hurricanes have increased in frequency, intensity, and duration over the past century[1,25,26,27] and climate models predict that this trend will continue as global warming continues.[4] Even if rain becomes less frequent, many areas throughout the United States will experience heavier downpours.[28] The annual number of days with precipitation exceeding two to four inches has already increased in the past 100 years.[25] While increasing global temperatures will create heavier precipitation events in some regions, acceleration of land-surface drying will also mean more frequent, more severe drought in others.[25]

Death and injury are the direct health impacts most commonly associated with extreme weather events. However, the environmental hazards left behind by natural disasters such as floods and hurricanes can also have a number of serious secondary health effects.

Water quality would be jeopardized by increased heavy rainfalls, especially if preceded by drought, as surface waters became polluted by runoff carrying human and animal wastes, pesticides, fertilizers, and other pollutants.[29] In the past, outbreaks of water-borne diseases, such as *Cryptosporidium* and *Escherichia coli*, have been linked to heavy rainfall events.[14,30] An analysis of 548 gastrointestinal outbreaks that occurred in the United States between 1948 and 1994 showed that 68 percent of cases were preceded by very heavy rainfall.[31] Threats to water quality from increased precipitation would be compounded by rising temperatures, which promote the growth of disease-causing bacteria.

In the ocean, the combination of rising surface water temperatures and increased nutrient loading from rivers carrying agricultural runoff may contribute to increased harmful blooms of algal species capable of producing biotoxins.[29] The consumption of fish and shellfish contaminated by these toxins can result in neurological damage, respiratory irritation, skin irritations, and gastrointestinal illness.[32]

Water quantity also may become an issue as a result of global warming. Droughts, decreased winter snow-packs, earlier snowmelt, and a shift to less frequent but more intense precipitation events could all put a strain on freshwater resources.[29] As water supplies decline, concentrations of human waste, animal waste, and other pollutants increase while stagnant waters provide breeding ground for disease vectors.[33,34] Poor, developing nations in southern and west Africa and in the Middle East are at particular risk to increased water stress and may experience a rise in the incidence of water-related diseases as people are forced to rely on increasingly contaminated sources of fresh water for all of their daily needs—drinking, cooking, bathing, and irrigation.[30]

Addressing Global Warming: A Public Health Imperative

The evidence base for global warming has grown stronger since the United Nations Intergovernmental Panel on Climate Change (IPCC) released its first scientific assessment of global warming. The World Health Organization (WHO) estimates more than 150,000 deaths and approximately 5 million 'disability-adjusted life years' (DALYs) annually as a result of increasing incidences of disease and malnutrition caused by global warming.[35] The public health impacts are expected to get worse, with climate models projecting a doubling of climate-linked disease burden by the year 2030 without regulatory action.[35]

With new data indicating that sea ice loss in the Arctic and Antarctic is accelerating and climate experts now warning that the Earth may be fast approaching a climate change tipping point, it is clear that we can no longer afford to delay action. To stabilize the earth's climate and avoid the most serious public health and environmental impacts, we must reduce our greenhouse gas emissions by 80 percent below 1990 levels.[36] This can be achieved by developing new, cleaner, and more efficient ways of producing energy, transportation, and goods.

The fastest and most affordable way to curb greenhouse gas emissions is to increase energy efficiency. Replacing older home appliances such as refrigerators and washing machines with more efficient models; improving heating and cooling systems; better insulating both commercial and residential buildings; and replacing old lighting systems with new advanced lighting systems that use compact fluorescent or LED bulbs—all these actions can drastically reduce energy use without having to sacrifice functionality or comfort. In fact, Amory Lovins of the Rocky Mountain Institute estimates that 75 percent of total electricity consumption in the U.S. could be displaced by more widespread use of the best electricity-saving technologies.[37]

Because the electric power industry is the single largest source of greenhouse gas emissions in the U.S.,[38] the generation of electricity using renewable energy technologies holds great potential for drastically reducing global warming pollution. Wind energy already is cost-competitive with new coal and gas-fired power plants, and the U.S. has tremendous potential for generating wind energy. In twelve states alone (North Dakota, Texas, Kansas, South Dakota, Montana, Nebraska, Wyoming, Oklahoma, Minnesota, Iowa, Colorado, and New Mexico), wind turbines could produce as much as 2.6 times the total electricity generation of the entire U.S.[39] Solar energy is another renewable energy source capable of making a significant contribution to meeting U.S. energy needs. While the current economics of solar energy are constrained, costs have steadily fallen in the past 20 years. Additionally, as the materials to construct solar panels become cheaper and more efficient, as production methods improve, and as installation becomes easier, solar energy is expected to become cost-competitive with conventional electricity production in the near future. Also holding enormous potential for renewable energy production is the harnessing of both geothermal heat energy and ocean tides and currents for electricity generation.

Automobiles are the second largest source of U.S. greenhouse gas emissions.[38] Thus, a significant increase in the fuel economy of cars and trucks is another essential component of any strategy to curb global warming. Fortunately, hybrid engines, flex-fuel vehicles capable of running on ethanol, and biodiesel engines are all gaining in popularity and commanding an increasing share of the automotive market. Increased automotive efficiency not only helps to slow global warming, but also reduces the emission of harmful air pollution, all while saving consumers money at the gas pump. As a result of increased purchases of minivans, pickup trucks, and SUVs, the current average fuel economy of America's passenger vehicle fleet is at its lowest point since the early 1980s and is far behind that of the European Union, Japan, and China. Existing technology is capable of nearly doubling the average fuel economy of America's cars, and even more significant improvements are possible in the near future as existing technologies mature and as new technologies such as fuel cells enter the market. By providing the appropriate incentives to both auto manufacturers and consumers, policymakers can ensure that these technologies continue to grow in market share and can lessen America's need for oil while drastically reducing the transportation fuel sector's contribution to global warming.

Though the task before us is formidable, we already possess the scientific, technical, and industrial know-how to greatly reduce global warming pollution. Scientists warn, however, that the window of opportunity is closing quickly and we must begin to curb global warming emissions within the next ten years to prevent the worst impacts from occurring. The time for action to stop global warming is NOW!

For all references, please visit the Publications and Resources page of the PSR website at http://www.psr.org/site/PageServer?pagename=enviro_resources.

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Medical Leadership on Global Warming

A Call to Action

Humans face many threats, but few are as significant in scope as the looming crisis caused by global warming. As members of the medical and public health communities we believe we have an obligation to speak out about the health consequences of global climate change and to issue a call for action.

On the back of this document you will find a set of principles that we endorse. We believe the Congress must recognize the onset of anthropogenic climate change, acknowledge the growing health threats and take action to slow, stop and reverse global warming.

We call on Congress to act now to stop global warming.

(Organizations, institutions listed for purposes of affiliation only)

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The American medical community believes it is necessary to acknowledge the onset of global warming, as indicated by the following:

- Since the beginning of the 20th century the Earth's average temperature has risen nearly 1.5 degrees Fahrenheit, much of that increase coming during the last 35 years. Increases in atmospheric concentrations of carbon dioxide have followed this trend, showing a direct correlation between temperature and CO_2 concentrations.
- Sea levels are rising, and ocean temperatures have increased, leading to a loss of Arctic sea ice in excess of 25 percent and the bleaching of coral reefs from warmer waters, while ocean acidification will continue to cause damage to delicate ecosystems.
- Melting permafrost threatens to increase the rate of warming as millions of tons of carbon dioxide and methane are released from these warming soils.
- The Intergovernmental Panel on Climate Change reports that these changes are correlated directly with the output of greenhouse gases that are attributable to industrialization. There is a solid consensus among climate scientists that anthropogenic forces are driving global warming.

We further find that:

- The American public will suffer from serious health impacts, including: heat related illness and death, advanced respiratory and cardiovascular disease as a result of worsening air quality and the threat of increased pest and water borne diseases.
- Changes in weather patterns, rising sea-levels and threats to water supplies will increase in the coming decades and could be catastrophic to some populations.
- The medical and public health services of the U.S. are not prepared adequately to handle sudden and dramatic increases in illness related to global warming.
- The United States is the leading emitter of greenhouse gas pollutants, and those emission levels continue to grow unabated.
- Unchecked, global warming represents a dangerous threat to public health.

The American health care community calls for immediate action to address the threats posed by global warming:

- In order to prevent this growing public health threat it is necessary to dramatically reduce the emission of greenhouse gases on a global level.
- As a primary contributor to global warming, it is necessary for the U.S. to adopt mandatory regulations that control the emission of greenhouse gases.
- The United States Congress, with the support of the administration, should move forward immediately to pass legislation that will implement a stringent global warming control program.
- This legislation should be comprehensive in scope and should ensure that carbon dioxide concentrations in the atmosphere do not reach 450 parts per million and should prevent the global average temperature from increasing by an additional 2 degrees Fahrenheit.
- Global warming initiatives, including efficiency and clean renewable energy sources, should be implemented immediately utilizing the most efficient and cost effective means to achieve greenhouse gas reductions in order to protect the American public.

Senator BOXER. Thank you, sir.

Susan R. Cooper, Commissioner, Tennessee Department of Health. We welcome you.

STATEMENT OF SUSAN R. COOPER, COMMISSIONER, TENNESSEE DEPARTMENT OF HEALTH

Ms. COOPER. Thank you, Madam Chairman and members of the Committee. I am here today as the Commissioner of the Tennessee Department of Health, and also as a member of the Association of State and Territorial Health Officials, or ASTHO. This organization represents all of the State and territorial public health agencies of the United States, the U.S. territories, and the District of Columbia. Our members are the chief health officials of these agencies. As Commissioner of Health, one would ask what our job is, and it is pretty simple. Our job is really to protect, promote and improve the health of the citizens of our States.

It is really a pleasure to be here today to discuss the human health impacts of climate change. I would like to begin by thanking you for recognizing the need to include the public health system in preparing for and responding to the consequences of climate change. ASTHO does support the scientific consensus put forward with the IPCC Fourth Assessment Report that the weight of evidence demonstrates that human factors have and will continue to contribute significantly to changing the world's climate.

We have validated this through a unanimous passage of our position statement about three weeks ago. Our statement complements the policy and position statements of the Centers for Disease Control and Prevention and the National Governors Association.

We know that the anticipated health effects related to weather and climate change include death and illness from heat waves, injuries from catastrophic events such as hurricanes, tornadoes and floods, increased air pollution with concurrent rises in respiratory and cardiovascular disease, detrimental impacts on water quality and quantity, and an increase in the incidence of vector-, food- and water-borne diseases.

Recent climate-related challenges from extreme weather events and the changing patterns of communicable disease, have already demonstrated the critical need to improve public health capacity to identify, prevent and respond to these threats.

We recognize that climate change has serious far-reaching implications for the health of this and future generations. So today, I would like to focus on the assertion that climate change has the potential to place unprecedented demands upon the public health infrastructure of the United States, the need for action to bolster State, Federal and local health systems to cope with these challenges, and urging our State, local and Federal government bodies, including legislatures, to provide leadership in the development and coordination of sound public health policy.

We acknowledge that there are great uncertainties regarding the project impacts of climate change on health. The actual impacts may be influenced by many confounding factors, such as socioeconomic status, demographic structures, geographical location, access to medical care, and adaptation measures. We as States continually and effectively respond to weather- and climate-related

events, but our systems are being taxed by these events as they are appearing with increased frequency and greater severity.

I would just like to give you a few State examples. In August of this year, Tennessee faced a significant and very deadly heat wave. It resulted in temperatures exceeding 100 °C for a number of days, accompanied by significant drought. Water systems were taxed. Power demands led to rolling electrical outages. Human effects were substantial, resulting in 15 deaths, 14 in one county.

We were very successful in proactively addressing the heat by working with the Governor's office and other State agencies to reach out to vulnerable populations to provide air conditioners to low-income elders and families with children; to coordinate water and cooling stations; and opening community health shelters for those at risk.

We have seen an algal bloom on the Chesapeake Bay, which has resulted in major fish kills, threatening oyster farms and certainly impacting human health through shellfish poisoning. In Montana, we know that this State is faced with significant wildfire threats and increasing temperatures will see a continued rise in those, contributing to increased respiratory distress and failure, death in many cases.

In Georgia, again they are facing significant droughts. Unfortunately, they have seen a rise in the occurrence of West Nile virus, where in Tennessee our drought has produced a decrease in West Nile virus.

There are many, many examples of this, but we are her today to ask for strong coordination and collaboration across all tiers of government to really improve our understanding of climate change so that we can optimally prepare and respond to these health impacts.

We urge you to look toward research investment to better understand the potential health impacts of climate change and to develop and enhance our surveillance capabilities to mitigate impacts. These efforts should include, but not be limited to initiating and promoting scientifically based health programs, developing practice standards, identifying promising practices and success stories, developing decision support systems that enable our agencies to predict, anticipate and model events, and develop early warning systems that will help us enable rapid response.

I see that my time is over. I have many more things I would love to share with you, but I will stop, and I would be happy to take any questions at the end.

[The prepared statement of Ms. Cooper follows:]

STATEMENT OF SUSAN R. COOPER, MSN, RN, COMMISSIONER, TENNESSEE DEPARTMENT OF HEALTH, REPRESENTING THE ASSOCIATION OF STATE AND TERRITORIAL HEALTH OFFICIALS

OPENING

Chairman Boxer, Senator Inhofe, Senator Alexander and Members of the Committee, I am Susan R. Cooper, MSN, RN, Commissioner of the Tennessee Department of Health and member of the Association of State and Territorial Health Officials (ASTHO). ASTHO represents the state and territorial public health agencies of the United States, the U.S. Territories, and the District of Columbia. Our members are the chief health officials of these agencies. My job is to protect, promote and improve the health of the citizens of my state. It is a pleasure to appear before you today to discuss the human health impacts of climate change.

BACKGROUND AND CHALLENGES

First, let me begin by thanking you for recognizing the need to include the public health system in preparing for and responding to the consequences of climatic change. ASTHO supports the scientific consensus put forward within the Intergovernmental Panel on Climate Change Fourth Assessment Report that the weight of evidence demonstrates that human factors have and will continue to contribute significantly to changing the world's climate. This recognition is clearly illustrated through the unanimous passage of a Position Statement on Public Health and Climate Change during the ASTHO Annual Meeting, held just three weeks ago. ASTHO's position statement compliments the policy and position statements of the Centers for Disease Control and Prevention and the National Governors Association.

The anticipated health effects related to weather and climate change include death and illness from heat waves, injuries from catastrophic events such as hurricanes, tornadoes, and floods, increased air pollution with concurrent rises in respiratory and cardiovascular diseases, detrimental impacts on water quality and quantity, and an increased incidence of vector-, food- and water-borne diseases. Recent climate-related challenges, from extreme weather events to changing patterns of communicable disease, have already demonstrated the critical need to improve public health capacity to identify, prevent, and respond to these threats.

ASTHO recognizes that climate change has serious far-reaching implications for the health of this and future generations. My remarks will focus on (1) the assertion that climate change has the potential to place unprecedented demands upon public health infrastructure in the United States, (2) a need for action to adequately bolster federal, state and local health systems to cope with the present and future challenges of climate change, and (3) urging federal, state and local government bodies, including legislatures, to provide leadership in the development and coordination of sound public health policy to address health impacts related to climate change.

ASTHO acknowledges that there are uncertainties regarding the projected impacts of climate change on health. The actual effects of climate change on population health are influenced by many confounding factors, including socioeconomic status of individuals and communities, demographic structure of the population, geographical location, access to medical care, and adaptation measures implemented to reduce negative impacts. Recognizing these uncertainties, ASTHO supports decisive action to adequately bolster public health infrastructure to prepare for future challenges.

KEY ISSUES AND STATE EXAMPLES IN THE HEALTH SECTOR

States continually and effectively respond to weather and climate related events but the systems are being taxed as these types of events appear to occur with increased frequency and with greater severity. I would like to give a few recent state specific examples.

In August of this year, Tennessee experienced a prolonged, severe heat wave which lasted eleven days where temperatures exceeded 100 degrees. This was accompanied by a severe drought. Water systems were severely taxed, resulting in numerous water restriction orders. Power demands led to rolling electrical outages in some areas. Human effects were substantial. Fifteen deaths were reported to be heat-related, fourteen of which occurred in one Tennessee county. An increase in heat related illnesses and injury was also reported. Through surveillance activities and proactive monitoring, the Tennessee Department of Health reached out to communities at risk to provide statewide information on preventing heat-related illness and injury. In addition, the TDOH worked with the Governor's office and other state agencies to identify vulnerable populations and to activate our public health preparedness system to implement mitigation strategies such as providing window air conditioning units to low income elders and families with children, coordinating water/cooling stations, and opening community shelters for those at risk.

With increased surface water temperatures, states all along U.S. coasts are seeing increases in harmful algal blooms. In 2007, a bloom along the Chesapeake resulted in a major fish kill and threatened oyster farms along the Bay. Blooms not only impact the aquatic life, but can also directly impact human health through shellfish poisoning, skin irritation from direct contact, respiratory distress by inhalation of toxins, and decreased availability of recreational waters. Algal bloom events also attract significant public and media attention. The Virginia Department of Health works collaboratively with other state agencies and academic institutions on a Harmful Algal Bloom Task force to monitor, respond to and communicate with the public about algal blooms.

In Montana, a state that routinely faces wildfire threats, increasing temperatures will result in more frequent occurrences of large, uncontrolled fires. Wildfires not

only pose a direct threat to the health and safety of nearby residents, but also create dangerous levels of particulates in the air, contributing to respiratory distress and failure, and death in many cases. In 2007, the Montana Department of Public Health and Human Services worked closely with the Department of Environmental Quality to issue alerts about air quality and health impacts, aimed particularly at vulnerable populations. The state health agency also utilized the Health Alert Network to communicate with local health professionals throughout the fire season.

CHALLENGES

In Georgia this year, an extreme drought situation has impacted both the availability of water and paradoxically resulted in an increase in mosquito populations throughout the state. Because of the lack of precipitation, residents are being forced to irrigate and water their lawns and gardens to make up for the drought, creating fertile opportunities for mosquito growth. Subsequently, human West Nile Virus cases have risen to more than twice the number as were reported in 2006. The public health outcomes and impacts of shifts in weather patterns on individual states and localities is unpredictable and complex. While Georgia saw an increase in West Nile Virus cases with an extended drought, Tennessee saw a 68 percent decrease in cases as a result of the severe drought and significant water use restrictions. In order to ensure adequate response to protect the public's health with such variations, it is essential that we maintain critical public health surveillance systems and that they be equipped to monitor real-time changes in disease trends.

Climate change may increase the number of known disease vectors, such as mosquitoes and ticks, or expand the geographic range of these disease vectors and their natural reservoirs. Climate conditions that increase water temperatures, water salinity or nutrient levels would change marine ecosystems along the Texas gulf coast and possibly increase diseases associated with fish and shellfish consumption and swimming. The impact of climatic change on disease occurrence is uncertain. However, to identify any change in disease occurrence, local and state health departments need to maintain disease surveillance activities to detect any changes in disease occurrence and to identify vulnerable subpopulations that would be adversely impacted by changing climatic changes. In 2005, the first cases of domestically acquired Dengue Fever were identified in Cameron County along the Texas-Mexico border. The Texas Department of State Health Services conducted an epidemiologic investigation and continues to conduct surveillance for Dengue Fever. In addition to changes in infectious disease patterns, health departments may need to develop new surveillance systems to measure non-infectious diseases such as heat-related deaths and asthma related to decreasing air quality. Maintaining and enhancing disease surveillance systems and having staff to analyze and evaluate information collected by these systems will ensure the detection of disease changes and ensure that appropriate disease intervention and control measures are initiated.

PLANNING AND PREPARING FOR CLIMATE CHANGE

ASTHO advocates strong coordination and collaboration across all tiers of governmental public health to improve understanding of climate change and enable optimal preparation and response to related health impacts. We urge federal, state and local government bodies, including legislatures, to provide leadership in the development and coordination of sound public health policy to address health impacts related to climate change.

ASTHO supports enhancing the ability of federal, state and local health agencies to understand and prepare for the health impacts linked to climate change in their jurisdictions. ASTHO urges the federal government to provide leadership, resources and programs to support state health agencies in developing educational initiatives to raise awareness of the link between climate change and human health among public health professionals and prepare for the potential health impacts with enhanced planning, surveillance initiatives, and event response. Sustaining funding for public health preparedness will be critical in helping state and local health departments maintain the capacity to respond to climatic and other public health emergencies.

ASTHO supports investment in research to better understand the potential health impacts of climate change and to develop and enhance surveillance and response systems to mitigate health impacts. These efforts should include, but not be limited to, initiating and promoting scientifically based health programs; developing practice standards; identifying promising practices and success stories; developing decision support systems that enable agencies to predict, anticipate and model events; and developing early warning systems that enable rapid response.

ASTHO emphasizes the importance of public health agencies and professionals to inform communities, policy makers, other government departments and industry of the public health impacts of climate change. Public health leaders must be at the forefront of all mitigation and adaptation actions related to climate change. ASTHO encourages public health agencies and professionals to actively engage with all stakeholders to insure consideration of the potential health impacts in all aspects of behavior, consumption and decision making that may contribute to climate change. ASTHO urges public health agencies and professionals to actively promulgate policies towards preventing and mitigating the public health impacts of climatic change.

In closing, I want to again thank the members of this Committee for your past commitment to improving the health, safety and wellbeing of our nation. We know that so much more can be and must be done to protect our nation's health as we continually anticipate and prepare for a myriad of public health threats. We welcome the opportunity to continue to work with you in pursuit of that goal.

Thank you for your attention. I will be pleased to answer any questions you may have.

RESPONSE BY SUSAN R. COOPER TO AN ADDITIONAL QUESTION FROM SENATOR INHOFE

Question. A recent article in "Geotimes" magazine shows that global population killed by natural disasters has decreased 10-fold since 1964, while the number of natural disasters has risen 5-fold. Would you say that humans are more prepared than ever for natural disasters?

Response. I can say, without reservation, that as a Nation, we are much better prepared today than ever before to effectively respond to all hazards, including natural disasters. It is important to emphasize that in addition to advancing critically important interventions to prevent the occurrence or at least mitigate the magnitude of such events, the public health community is also responsible for managing the health and medical consequences when emergencies and disasters do occur. This is paramount given the ever increasing threats our society faces and must deal with, and the fact that we will never be in a risk-free environment and public health must remain at the ready to prevent, control and reduce illness, injury, and mortality.

The example you have shared clearly illustrates success in this regard. Through effective pre-event planning, training and exercising response personnel, use of rapid detection and surveillance systems, early warning and communications strategies including public education and awareness, and building surge capacity in our health care system to handle mass casualties, we have and will continue to strive to further reduce the impacts of man-made and natural disasters and acts of terrorism.

We are clearly seeing the return on our investment in rebuilding and strengthening our public health system since 2001. We must, however, sustain these capacities and capabilities and further expand them in order for all jurisdictions to be equally well prepared at all times. We cannot become complacent and let our guard down. The threats and challenges from all sources, including those such as extreme weather events and the emergence of infectious diseases which may be attributed to climate change, warrant priority consideration as it pertains to federal funding, technical assistance provided to states and localities, and sound national policies and strategies.

RESPONSES BY SUSAN R. COOPER TO ADDITIONAL QUESTIONS FROM SENATOR BOXER

Question 1. Please describe the importance of preventing conditions that create health threats, rather than acting to reduce the adverse impacts of such threats.

Response. Primary prevention involves taking action to prevent problems from occurring before the onset of symptoms. It focuses on environmental or systemic changes that are aimed at entire populations, such as an entire community, rather than treating one individual at a time.

About twenty years ago, a metaphor about "going upstream" was created to help explain the value of prevention. Today, that metaphor still works well for creating new converts. This example taken from the Prevention Institute (*www.preventioninstitute.org*) helps explain the value of prevention. Suppose you are standing next to a river, and you see someone drowning as he floats downstream. You jump into the river and pull him ashore. As soon as you've done that, you see

another person in trouble, again floating downstream, and you rescue her as well. Every time you've saved one person, you see another, and another. After you've dragged another drowning body out of the river, you're thoroughly exhausted and you know you don't have the energy to save one more victim so instead you decide you must go upstream to find out what is causing these people to drown. If you can prevent whatever is causing these people to drown at the source, you won't have to continue saving the victims, one by one. Eventually, you find that people are falling into the river because they are stepping through a hole in a bridge. You fix the bridge, and people stop falling in. Primary prevention means "going upstream" and fixing the bridge before more people fall into the river. This takes fewer resources, and results in less pain and suffering than pulling each drowning person out of the river.

While "downstream" efforts are important and represent one of the primary roles of public health, focusing attention and effort "upstream" will more effectively reduce human suffering, medical costs, productivity losses, injury and death.

ASTHO encourages policy makers to make prevention a cornerstone of America's health system. Ensuring that a reformed health system incorporates prevention policy principles would have an enormous impact on the health of the American people. Delivering preventive services that have been proven effective is essential if we are to optimize the health of our citizens.

Investing in prevention means supporting the two approaches that health professionals use to promote health and prevent disease, namely, (1) improving the quality and quantity of clinical preventive services delivered to individual patients and (2) implementing community preventive services, programs, and policies aimed at broad populations or sub-populations.

Considerable and compelling evidence makes clear that community preventive services aimed at populations have an enormous impact on health and are extremely cost-effective. The nation will get a much greater return on investment by focusing on health improvements in communities, schools, and worksites rather than focusing solely on what occurs in traditional healthcare settings, such as doctors' offices and hospitals.

A health system continuum must be developed that goes from community-based health promotion and disease prevention, to primary care-based health promotion and disease prevention, to primary-based early detection and treatment of disease, to specialty care diagnostic testing, hospital care, emergency care, and end-of-life care.

Question 2. What types of coordinating activities by the federal government can best assist states to prepare to address the human health impacts from global warming?

Response. ASTHO advocates strong coordination and collaboration across all tiers of governmental public health to improve understanding of climate change and enable optimal preparation and response to related health impacts. ASTHO urges the federal government to strongly consider the health impacts related to climate change as a key consideration in reforming existing policy and law, and in future decision making and resource allocation that may contribute to negative health outcomes from climate change. Policies and decisions that further contribute or exacerbate changes in climate, should strongly consider adverse effects to the health of the community in all deliberations. Further, policies and practices from federal agencies that can help to mitigate the emerging threats to public health from climate change and that can support health agencies to better prepare for the health impacts are urged.

Coordination of a comprehensive research agenda to establish a more complete picture of evidence as to the health impacts associated with climate change is of paramount importance. Establishing a core center to coordinate and pursue this research agenda with participation from all arms of the federal government is urgently needed. In addition to fundamental research on health impacts, the establishment of a research agenda to develop improved systems to undertake surveillance to monitor and model changes and their likely effects on public health is also in great need. The coordination of leading federal agencies to develop early warning systems tied to changing weather patterns, natural ecology and human factors will add to the capabilities of state and local health agencies to manage changes to public health threats.

ASTHO urges the first tier involvement of the Department of Health and Human Services (DHHS) in all federal initiatives related to addressing climate change. ASTHO believes that it is imperative that public health is fully and equally engaged with all other considerations when working towards the challenges that climate

change presents, and urges the federal government to include representation from DHHS in all federal discussions related to climate change.

As Climate Change and the health effects that may be experienced will be very different from region to region, the federal government must play a greater role to coordinate activities, provide sage technical assistance and guidance and foster adequate and necessary allocation of funding for specific initiatives. Increased coordination should enable more flexibility to improve resource allocation and can ensure commonality in the goals of the different arms of the federal government.

Senator BOXER. Thank you very much.

Dr. Roberts, we welcome you. Dr. Roberts is Professor Emeritus, Uniformed Services University of the Health Sciences.

STATEMENT OF DONALD R. ROBERTS, PROFESSOR EMERITUS, UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

Mr. ROBERTS. Thank you, Chairman Boxer.

I will address the specific issues of climate change and vector-borne diseases.

Opinions and perspective of individuals who have long and credible histories of insect-borne disease research and operational experience have often been excluded from the debate on the role warming temperatures might have on future trends of malaria and other insect-borne infections. For this reason alone, I appreciate the opportunity to be here today to describe the work and evidence compiled by some of those experts.

The human health impact of global warming is being used as an argument for political actions to forestall theoretical harm. I am concerned about the scientific validity of this argument. I am also concerned about the consequences political actions will have for poor people in the United States and elsewhere.

The acquisition of human disease is under great regulatory control of human behavior, disease-preventive measures, the economy, and standards of living. I will briefly summarize two reports.

One was on dengue along the border of Texas and Mexico. This was conducted by CDC. There was low risk of dengue on the Texas side because of air conditioning that prevented mosquitos from entering houses or places of businesses and transmitting disease. This was not true for most businesses and households in Mexico, illustrating the importance of a vigorous economy and high standards of living to prevent dengue.

The same is true of our protections against malaria. Malaria-infected people continually enter the United States, yet we maintain almost no response capability to an imported case or exercise any specific preventive measures. Our freedom from malaria is not because of cold U.S. temperatures, use of insecticides, antimalarial drugs, or any other specific malaria-preventive measure.

No, our 60-year record of freedom from endemic malaria is a result of wealth and high standards of living. Indeed, a high standard of living is far and away the best malaria preventive measure yet discovered.

However, absent a strong economy and high living standards, malaria preventives will still eliminate or reduce malaria transmission. This point is illustrated with results of malaria control operations in Southern Africa. Joint malaria control operations in

Swaziland and Mozambique have been underway since 1999. Again, I will summarize the results.

In pre-spray surveys, infection rates in children in Mozambique were 64 percent. In Swaziland, they were 2 percent to 8 percent. The only explanation for low malaria infections in Swaziland and high infection rates just across the border in Mozambique was Swaziland sprayed houses. Mozambique did not. After spray operations were implemented in Mozambique, malaria rates on the Mozambique side of the border dropped from a pre-spray rate of 62 percent to 38 percent in 2001, and 22 percent in 2002, and 8 percent in 2003. Rates also dropped in Swaziland to 0.25 percent.

In summary, we can control malaria regardless of warm temperature or other natural ambient conditions. Our malaria problems stem from failure to do so.

I would like to end my testimony with comments about who might be harmed by political action on climate changed based on the idea that insect-borne diseases will spread. Luckily, we can learn from history. In previous history before this Committee, I detailed the unfortunate political process that led to restrictions on the use of DDT and other insecticides in malaria control. These restrictions were not based on scientific evidence, and we can trace the re-emergence of malaria to the rise in political pressure to ban the use of DDT and to dismantle spraying programs.

The people who paid for this unscientific political action were poor people in poor countries, and over many years millions paid with their lives. It has taken many hard, difficult years to fight against this anti-insecticides agenda, but now the U.S. Government is once again supporting malaria control that uses insecticides, including DDT. As a result, lives are being saved and malaria control is improving in many countries.

We have a responsibility not to repeat past mistakes. I would urge this Committee to pay close attention, close and careful attention to the science and to disease control experts before taking political action on climate change on the basis of the spread of insect-borne diseases.

Thank you.

[The prepared statement of Mr. Roberts follows:]

STATEMENT OF DONALD R. ROBERTS, PROFESSOR EMERITUS, UNIFORMED SERVICES UNIVERSITY OF THE HEALTH SCIENCES

Thank you Chairman Boxer, ranking member Inhofe and members of the Senate Committee on Environment and Public Works for the opportunity to present my views on human health impacts of global warming.

Opinions and perspectives of individuals who have long and credible histories of insect-borne disease research and operational experience have often been excluded from the debate on the role warming temperatures might have on future trends of malaria and other insect borne infections. For this reason alone, I appreciate the opportunity to be here today to describe the work and evidence compiled by people with hands-on-experience in the field of vector-borne disease control.

The topic of your hearing is important. The human health impact of global warming is being used as an argument for political actions to forestall theoretical harm. I am concerned about the scientific validity of this argument. I am also concerned about the consequences political actions will have for poor people in the United States and elsewhere. I will address these concerns in the course of my testimony.

A BBC report detailed a claim by WHO and researchers[1] that global warming would cause major increases in insect borne diseases. This claim is often repeated and similar claims have even suggested that global warming will worsen the problems of malaria in Africa and other endemic regions.[2]

No knowledgeable biologist would argue temperatures do not influence developmental rates of mosquitoes or developmental rates of malaria parasites in mosquitoes. Temperature does, in fact, have strong regulatory control over these developmental events. Likewise, combinations of factors, such as warming temperatures and increasing rainfall can produce favorable conditions for mosquito production. However, acquisition of insect-borne pathogens is complex and should never be reduced to considerations of warming temperatures alone. The one thing we have learned through the course of time and experience in control of insect-borne diseases is that presence of disease is largely a product of a few, very important, factors. One is human behavior as it relates to disease acquisition. Another factor is preventive measures to stop disease transmission. Another two factors are economic conditions and standards of living that work to prevent acquisition of disease. I want to illustrate the importance of the latter two factors with a study conducted by a large team of investigators led by Dr. Paul Reiter in the border area with Mexico.[3]

Each year Mexico reports outbreaks of dengue fever. For example, on Sunday, October 20, 2007, the Secretary of Health announced a dengue epidemic underway in Mexico, with almost 23,000 cases so far this year and 6 deaths.[4] Dengue outbreaks even occur along the border of Mexico with the United States. However such outbreaks generally do not extend into the United States.

The study I refer to was conducted in 1999 and encompassed two border towns, one in Mexico (Nuevo Laredo) and one in Texas (Laredo). The two towns are located close together and combined could be viewed as a single city with a river running through it. Temperature and climatic conditions in Laredo and Nuevo Laredo are practically the same. The population of Laredo was 200,000 and Nuevo Laredo was 289,000. The study involved collecting data on mosquito abundance and sero-prevalence of dengue infections (analyses of anti-bodies as evidence of previous dengue infection) in sample households in the two towns. Investigators found that *Aedes aegypti*, the urban vector of dengue virus, was more abundant in Laredo. Yet, seroprevalence of dengue was greater in Nuevo Laredo. So, while the mosquito vector was "remarkably" abundant in the Texas town, risk of dengue infection was much less. The investigators used various sets of data to show that the major factor accounting for lower risk of dengue infections in Laredo was extensive use of air conditioners and evaporative coolers. In Laredo, houses and business were enclosed and people remained indoors where it was cool. As a result, mosquitoes could not enter houses or places of business and transmit disease. This was not true for most businesses and households in the Mexican city of Nuevo Laredo.

Essentially, the 1999 study illustrates the importance of a vigorous economy and high standards of living to prevent dengue and other important insect-borne diseases. The same is true of our protections against malaria. Many malaria-infected people are reported in the United States each year. For example, over 1,300 imported cases were documented in 2002[5] and this does not accurately account for many unreported cases that occur in illegal workers. In spite a continuous flow of malaria infections into the U.S., our country does not have endemic malaria. We have sustained this relative freedom from malaria for almost 60 years. Yet, we maintain almost no response capability to an imported case or exercise any specific preventive measures. Our freedom of malaria is not because of cold U.S. temperatures, use of insecticides or anti-malaria drugs, or any other specific malaria preventive measure. No, our freedom from malaria is a direct result of wealth and high standards of living. Indeed, a high standard of living is far and away the best ma-

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[1] BBC News. Global warming disease warning. Friday, June 18, 1999. Website: http://news.bbc.co.uk/1/hi/sci/tech/372219.stm "The World Health Organisation (WHO) says global warming could lead to a major increase in insect-borne diseases in Britain and Europe."

"This in turn could lead to an increase in disease-carrying pests such as ticks, mosquitoes and rats, which live in warmer climates and whose breeding-grounds are often in damp areas."

"'There is an urgent need to consider how to improve research and monitoring and how to minimise adverse health impacts,' they write in a report in the British Medical Journal."

[2] Warming trend may contribute to malaria's rise. Science Daily, March 22, 2006. Website: http://www.sciencedaily.com/releases/2006/03/060322142101.htm

[3] Reiter P, Lathrop S, et al. Texas lifestyle limits transmission of dengue virus. Emerg Infect Dis [serial online] 2003 Jan. Available from: URL:http://www.cdc.gov/ncidod/EID/vol9no1/o2–0220.htm

[4] Folha Online [20.10.2007] *http://www1.folha.uol.com.br/folha/mundo/ult94u338268.shtml*

[5] http://www.ncbi.nlm.nih.gov/sites/entrez?cmd=Retrieve&db=PubMed&list—uids=12875252&dopt=AbstractPlus

laria preventive measure yet discovered. However, absent a strong economy and high standards of living, malaria preventives will still eliminate or reduce malaria transmission, regardless of amount of rainfall or regardless of warming temperatures. To illustrate this point I will describe results of malaria control in southern Africa.

I take this example from the Lubombo Spatial Development Initiative (LSDI).[6, 7] This is a joint program between the governments of Mozambique, Swaziland, and South Africa to develop the general region into a competitive economic zone. The communities in this zone (Lubombo region) of high malaria risk are some of the poorest in the region. Malaria control was a priority undertaking of the LSDI because malaria control was recognized as a precursor to development. The tri-national program agreement was signed in 1999 and various stages of the program got underway in October 1999. Of the three countries, I will compare conditions in Swaziland with Mozambique.

Environmental conditions and native peoples of the adjoining strips of Mozambique and Swaziland are very similar. Patterns of temperature and rainfall are similar. There is considerable poverty in both and the only truly significant difference, in regard to malaria, is that Swaziland has maintained an indoor spray program for many years.[8] For this reason, when pre-spray (as far as the startup of the Lubombo initiative) surveys were conducted in 1999, malaria prevalence at the 4 sentinel sites in Swaziland was 2–8 percent. There were no significant differences in infection rates in children versus older age groups. In striking contrast, Mozambique had no routine spray program leading up to the pre-spray survey. Child and adult prevalence surveys were conducted at all sites in the first survey round in December 1999 in Mozambique. Average infection rate in children was 64 percent and 30 percent in adults. Infection rate differences in children and adults are attributed to protective immunity from frequent malaria infections. In other words, children in Mozambique were more susceptible to infection than were adults.

Data from these two countries show how preventive measures can truly provide high levels of malaria prevention in areas of high malaria risk. The level of protection is revealed in low infection rates in Swaziland (2–8 percent) versus 30 to 64 percent infection rates in adults versus children in Mozambique. The only explanation for low malaria infections in Swaziland and high infection rates just across the border in Mozambique was Swaziland sprayed houses. Mozambique did not. Additionally, once malaria infections were reduced in border areas of Mozambique, Swaziland infection rates dropped even lower. This drop was attributed to fewer imported malaria cases from across the border with Mozambique. By 2006, infection rates in Swaziland were only 0.25 percent. After spray operations were implemented in Mozambique, malaria rates on the Mozambique side of the border dropped from a pre-spray rate of 62 percent to 38 percent in 2001, 22 percent in 2002, and 8 percent in 2003. This example provides stark testimony to the fact that we can exert effective control over malaria regardless of warm temperatures or other natural ambient conditions. The bottom line is, we can control malaria. Our malaria problems stem from failure to do so.

I would like to end my testimony with a few comments about who might be harmed by political action on climate change based on the idea that insect borne diseases will spread. Luckily we can learn from history. In previous testimony before this committee I detailed the unfortunate political process that led to restrictions on the use of DDT and other insecticides in malaria control. These restrictions were not based on scientific evidence and we can trace the re-emergence of malaria and other insect borne diseases such as dengue to the rise in political pressure to ban the use of DDT and to dismantle the spraying programs. The people who paid for this unscientific political action were poor people in poor countries and, over many years, millions paid with their lives. It has taken many hard and difficult years to fight against this anti-insecticides agenda, but now the U.S. government is once again supporting malaria control that uses insecticides including DDT. As a result, lives are being saved and malaria control is improving in many countries. But many lives were lost thanks to the unscientific and largely political anti-insecticides campaign. We have a responsibility not to repeat past mistakes. I would urge this committee to pay close and careful attention to the science and to disease con-

[6] Sharp BI, Kleinschmidt I, et al. Seven years of regional malaria control collaboration—Mozambique, South Africa, and Swaziland. Am J Trop Med Hyg 76(1), 2007:42–47.

[7] Lubombo. Malaria control in the Lubombo spatial development area. A regional collaboration. Report produced on behalf of the Regional Malaria Control Commission by the MRC and UCT. August 2004:34 pp.

[8] Tren R. Africa Fighting Malaria. Washington D.C. personal communication October 18, 2007.

trol experts before taking political action on climate change on the basis of the spread of insect borne diseases.

RESPONSES BY DONALD R. ROBERTS TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. You testified about the program instituted by several poor African nations to reduce malaria. I was startled to hear about the enormous difference that Swaziland's, and later, Mozambique spraying program made in decimating malaria rates. Can you discuss further your views on the argument that increasing temperatures mean that malaria deaths will skyrocket?

Response. Those who argue that warming will increase malaria deaths base their opinions on certain fundamental, but irrelevant, relationships. One irrelevant relationship is warming temperature can speed development of insects and pathogens inside insects. Another irrelevant relationship is that warming may change area ecology and allow a competent malaria vector to move in and transmit disease to people who live there. I will explain why these relationships are irrelevant; but first I want to focus attention on how climate change can actually reduce risks of disease and death.

It is important to understand that too much warming can accelerate death of malaria-carrying mosquitoes. In fact, even modest warming, in absence of adequate humidity, can reduce survival of the malaria mosquito. As mentioned above, some argue that warming temperatures will change local ecology in ways that favor increased survival or improve reproductive success of malaria mosquitoes. In fact, changes in local ecology can have no affect at all on malaria mosquitoes or work against both survival and reproductive success of malaria mosquitoes. Likewise, warming and ecological changes may be entirely neutral or even work against invasion of competent vectors into areas where they have not been before. The reason for focusing attention on these interactions is to advise that belief in warming temperature as a cause of increasing malaria deaths is wrong.

Temperature is just one of many factors that influence the transmission and spread of arthropod-borne diseases (such as malaria). We can consider the appearance and spread of Lyme disease in the United States to get a better understanding of the complexities and regulatory controls of these diseases. Lyme disease, as with other arthropod-borne pathogens, can benefit from warming temperatures.

Lyme disease was first recognized as a disease entity in the northeastern U.S. in the 1960s[1]. It has grown as a public health problem since those years and has spread into many new areas. I recall when it was not present in Maryland. Then in the 1980s the disease made its appearance in Maryland and is now strongly entrenched there. It has spread to other states as well. Unlike malaria, which is transmitted by mosquitoes, ticks transmit Lyme disease and rodents are important in Lyme disease epidemiology. Yet, deer are the preferred host of the adult tick and increases in deer populations have facilitated spread of this disease. As numbers of deer continually increased, especially in urban areas, tick densities increased, the disease spread to new areas, and human infection became more common. Thus, Lyme disease is an example of a disease agent that benefits from warming temperatures but is most prevalent in colder regions. The reason for this distribution is that temperature is only one factor in a vast array of factors that influence Lyme disease distribution and proliferation. The same is true for malaria.

Basically there is no scientific basis for fear that increasing temperatures will produce more and more cases of malaria and more and more malaria deaths. Scare stories about warming temperatures and increasing disease often utilize stories about malaria moving to highland areas as proof that warming temperatures will cause increases in disease and death. Such stories often fail to state that highland malaria is not new and malaria has occurred in the highland areas before. Indeed, malaria has occurred in highland areas around the globe. In decades past, malaria was even common in very cold northern regions of North America and Russia. In the big picture, these popular stories about highland malaria are just not that important. Highland malaria represents a relatively minor component of the global burden of human malaria.

Malaria was once endemic in the United States and Canada.[2] Malaria was eliminated from this large geographical area through systematic use of malaria control

[1] Steere AC, Coburn J, Glickstein L. The emergence of Lyme disease. J Clin Invest. 2004 April 15; 113(8): 1093–1101.

[2] MacLean JD, Ward BJ. The return of swamp fever: malaria in Canadians. CMAJ. JAN. 26, 1999; 160 (2): http://www.cmaj.ca/cgi/reprint/160/2/211.pdf

methods, growing wealth, better housing, and improved standards of living. It did not disappear as a result of lower temperatures and it will not return to the U.S. and Canada as a result of warming temperatures. Mankind has the ability to control, and in some locations, even eliminate malaria. Mankind also has ability to treat cases and, by and large, prevent deaths. In the world today, the fundamental cause of increasing malaria is our failure to use tools like DDT and other insecticides to prevent transmission and proliferation of disease. Likewise, the basic cause of huge numbers of malaria deaths is our failure to build proper public health infrastructure and to promptly diagnose and treat infections.

In written testimony I presented evidence to confirm the relationships described above.

Question 2. If malaria is controllable, what would you say is the primary reason for the ineffective response to this threat?

Response. Even though malaria is a controllable disease, it is an extremely complex disease to control and requires detailed knowledge of mosquitoes, parasites and human behavior. Resistance to malaria treatments has been particularly challenging and has required enormous investments in new malaria drugs. The somewhat fickle nature of international aid has meant that donor support for malaria control is dependent on political will and interest both in donor nations and malarial countries alike.

Yet the primary reason for the ineffective response to re-emerging malaria has been environmental activist campaigns against public health programs for spraying insecticides inside homes, and DDT in particular.

There is no disputing the fact that environmental activists have worked for decades to stop use of insecticides in malaria control programs. This activism was on display in the 1970s suite environmental groups to stop USAID from exporting DDT for use in national malaria control programs. But this was just one small step in a much larger and globally orchestrated campaign to eliminate house spray programs and public health uses of insecticides. This campaign was behind the 1997 World Health Assembly resolution for countries to reduce reliance on use of insecticides for disease control. The fact that the 1997 resolution was adopted attests to the success of the global campaign to shut down national spray programs. And, of course, the natural outcome of their success has been ongoing re-emergence of devastating diseases as typified by malaria and the global dengue pandemic.

Shamefully, the same organizations that campaigned tirelessly to eliminate use of public health insecticides and allow diseases to re-emerge are now claiming global warming is the cause of increasing malaria. The public record of many activist organizations is on public display in opposing public health use of insecticides and in claiming global warming is facilitating the re-emergence of devastating diseases. Environmentalists should be broadly condemned for their role in unleashing those diseases on poor people of the world. They should also be broadly condemned for dishonestly using growth of those diseases as a cause celebre for fundraising in modern campaigns against global warming.

Question 3. Is there anything else you would like to comment on in regards to the hearing?

Response. Yes, there are two issues I would like to comment on in regards to the hearing.

The first issue is an inference that the spread of West Nile Virus was caused by warming temperatures. In the discussion part of the hearing I stated that warming temperatures were not responsible for WNV spreading across the lower 48 states. I would like to add to that statement.

It is true that warming temperatures can speed development of mosquito larvae in water. It is also true that warming temperatures can speed development of viral infection in mosquitoes. Yet, warming was not responsible for the appearance of WNV in 1999[3] or spread of WNV in the U.S. If warming temperatures were the cause of the spread of WNV across the contiguous 48 states, then human infections would have been more common in the south, where temperatures were warmer, than in the north, where temperatures are cooler. In fact, the opposite is true. With few exceptions, the greatest concentrations of human infections occurred in more northern areas of the country. These observations can be verified by a quick examination of the maps prepared by the CDC (see: *http://diseasemaps.usgs.gov/wnv—us—human.html*). Revealed in those maps are suggestions of far more important

[3] Nash D, Mostashari F, et al. The outbreak of West Nile virus infection in the New York City area in 1999. *N Engl J Med.* 2001 Jun 14;344(24):1807–14.

factors in the distribution and transmission of WNV than just warming temperatures.

There is a range of ambient temperatures that permit mosquito and virus development and those temperatures are normally present throughout the U.S. during much of the Spring, during Summer months, and much of the Fall. In other words, conditions are favorable for spread of WNV with or without any unusual warming of ambient temperatures. Besides, as described in response to the first question, too much warming can actually begin to work against mosquito survival and disease transmission.

The second issue I would like to comment on in regard to the hearing is how we should use public funds to prepare for theoretical harm from warming temperatures. Our first line of defense against insect-borne diseases has been use of chemicals to repel, irritate, or kill insects. This statement is as true today as it was in the mid-1940s when mankind started using DDT for disease control. Yet, since the late 1960s, agencies within the United States have been working to systematically get rid of those chemical tools. Not only have vast millions, if not billions, of dollars been spent in one way or another to oppose public health insecticides, the U.S. government has invested almost nothing in research to find better chemical tools. The anti-insecticide campaign has ruined disease control programs, eliminated valuable chemical tools, and gutted national research expertise. As a consequence, today we have far fewer cost-effective chemicals to combat arthropod-borne diseases like malaria than in the 1960s.

There would be no better use of public funds to combat re-emerging diseases than to reinvest in research. I have presented previous testimony that DDT functions mostly as a spatial repellent. When it is sprayed on house walls it stops malaria mosquitoes from entering houses and transmitting malaria to residents while they sleep. It should be viewed as a humanitarian disaster that there is no fully funded research program in the world focused on finding a spatial repellent as substitute for DDT in malaria control programs. The public health community needs a new and heavily funded program to find new chemicals and new methods for using spatial repellents, contact irritants, and insecticides. I am describing an old problem that needs to be addressed and resolved. It is time to address this national tragedy by appropriating new research and development money specifically for finding new chemical tools and new methods of using public health insecticides.

RESPONSE BY DONALD R. ROBERTS TO AN ADDITIONAL QUESTION FROM SENATOR BOXER

Question. Do you agree that the Intergovernmental Panel on Climate Change in 2007 described a range of potential health effects from global warming, including respiratory problems and diseases, water-borne diseases, impacts from extreme weather events, among others, in addition to vector-borne diseases?

Response. Yes, I agree that the Intergovernmental Panel on Climate Change in 2007 described a range of potential health effects from global warming, including respiratory problems and diseases, water-borne diseases, impacts from extreme weather events, among others, in addition to vector borne diseases. Yet, I also know they claimed global warming would increase malaria deaths and problems of other insect-borne diseases. I am not well-versed in the other potential health harms they describe. However, their claims about climate change, malaria, and other arthropod-borne diseases are wrong. In my opinion, they are indulging in scare tactics to scare the public as a means of changing policies. The IPCC loses credibility through these tactics and it gives me pause to wonder to what extent they are indulging in the same scare tactics with their other claims.

There is an important decision making process for dealing with each potential health effect from global warming. In each case, there should be balanced consideration of whether it is best, both in cost to the economy and long-term outcome, to research methods and solutions to the problem opposed to enacting policies and programs that might amount to endangering economies of the world, to include that of the United States, to stop global warming. This is particularly important given the unequivocal and direct link between poverty and mosquito borne diseases such as malaria. Policies designed to deal with global warming on the basis that it will increase the spread of mosquito borne diseases may well exacerbate these diseases and worsen the misery that they cause for millions of people in poor countries.

Senator BOXER. Thank you, sir.

Well, Dr. Roberts, your answer to global warming is more pesticide use. My answer is reduce the impacts of global warming so

you don't have to get into that battle of DDT and who is right and who is wrong. I think that is a very big difference between us.

Are you familiar with West Nile virus?

Mr. ROBERTS. Yes, ma'am.

Senator BOXER. Do you know when health officials first recorded its introduction here in America?

Mr. ROBERTS. It was in 1999.

Senator BOXER. Correct. Can mosquitos and other animals carry this disease?

Mr. ROBERTS. Mosquitos do carry the disease. They transmit the disease.

Senator BOXER. So the answer is yes.

Now, 8 years later, rather than being in one State, because you said we already can deal with it, how many States have recorded finding West Nile virus?

Mr. ROBERTS. West Nile virus has spread across the whole of the United States. It is a zoonotic infection.

Senator BOXER. Yes, 48 States have it. So do you agree that preventing the conditions that allow the spread of disease-carrying mosquitos is more health protective than taking actions once the disease spreads?

Mr. ROBERTS. With all due respect, Senator, I do not see a link between warming temperatures and the spread of West Nile virus. West Nile virus would have spread across the United States regardless.

Senator BOXER. Okay. Do you see the connection between warm standing water and mosquitos?

Mr. ROBERTS. Of course. Yes, ma'am.

Senator BOXER. Thank you. That answers my question.

Dr. McCally, how do you feel about this whole notion of just saying, well, let's not worry about it; we will just spray?

Dr. MCCALLY. It has been correctly pointed out that the control of endemic infectious disease requires a number of modalities. I think that to slow down our response to climate change and the scope of the health effects that it is already demonstrating and causing because of disagreements about the specifics of the public health response to malaria or to West Nile virus is terribly misleading.

Senator BOXER. I would ask you this, your testimony, Dr. McCally, refers to one study that estimates that global warming could cause the number of unsafe air days to increase by 68 percent. What would this mean for emergency room visits by the most vulnerable in society, our children, the elderly and people with asthma?

Dr. MCCALLY. We know from studies in Southern California and Atlanta and elsewhere that emergency room visits for chronic lung disease, including asthma in children, tracks those changes very closely.

Senator BOXER. Dr. Cooper, Commissioner Cooper, I am sorry, the IPCC predicts an increase in wildfires from global warming. What are the projected public health impacts from increased wildfires? This is very meaningful to me as I see my people in California just suffering to even find enough air to breathe right now. Here is just a picture you can just see. It is just extraordinary.

There is a connection between global warming and these wildfires. So what does it mean to the vulnerable citizens?

Ms. COOPER. Certainly, we know that wildfires post a direct threat to the health and safety of nearby residents, but it also creates dangerous levels of particulates in the air. These particles certainly contribute to increasing respiratory complications, things like increasing the incidence of asthma, the severity of the asthma cases as children or vulnerable adults present to their health care providers. They certainly can contribute to respiratory distress and failure, which would lead to death in very many cases.

So we certainly would encourage actions that would allow us to put public health systems in place that would allow us to respond earlier to potential threats.

Senator BOXER. Thank you very much.

Senator Barrasso.

Senator BARRASSO. Thank you very much, Madam Chairman.

Dr. Roberts, if I could, I was looking at your background with the Tropical Health Department of Preventive Medicine at the Uniformed Services Health Science Center. I remember fully when that program was begun. I want to focus on your comments. It is politics versus science. I know you are concerned we are overreacting and where we ought to be going from here.

Mr. ROBERTS. My specific concern, Senator, is that we not enact policies precipitously, specifically on the basis of the reported increase in diseases like malaria and dengue, which is another anthroponosis, increasing beyond our ability to control it, specifically as a result of global warming. In my opinion, that will not happen.

Senator BARRASSO. When I look at West Nile virus, which we certainly had in my State, certainly it is something we see in the summer, but my understanding from the study of it was that it didn't have to do with global warming. It just had to do with the disease and how it is transmitted and how it exists. Do you want to comment a little bit more on that?

Mr. ROBERTS. This was with West Nile?

Senator BARRASSO. Yes, sir.

Mr. ROBERTS. Right. West Nile virus is a zoonotic infection. As a consequence, we acquire that infection mostly outside, outdoors. Our ability to control it, therefore, is extremely limited because of the very broad environment in which that disease cycles.

And so, basically the disease will run its course. There is not a lot that we can do about it. Except in urban area of concentrated populations, some spraying could be beneficial. It is very different than what we see with malaria or, say, dengue fever. These are anthroponotic infections. They cycle entirely within mosquito populations and humans, and therefore our ability to control those, what I call the great diseases, is entirely different. We can control those through appropriate use of preventive measures.

Senator BARRASSO. Thank you. No further questions.

Senator BOXER. Thank you.

At this time, I am going to put in the record this call to action, Medical Leadership on Global Warming. I am going to share it with you, Dr. Roberts and with you, Senator Barrasso, because this is well over 100 leading physicians from the leading universities all

over our great Nation, just telling us that this is a looming crisis and we have an obligation to act. I think it is very different than Dr. Roberts' point of view, which is a minority point of view, but I certainly respect it, sir. But I think we ought to place this in the record at this time.

Senator Cardin, you are next.

Senator CARDIN. Commissioner Cooper, I want to talk a little bit about the importance of the information we get from State health departments and from county health departments. It is our warning system in our community. There is an infectious disease problem. The information is reliable. It helps us to deal with it, not only in the specific county or State in which the reports come in, but to deal with it in our Country and beyond the borders of our Country.

It has also been modified since September 11th to deal with threats to our Country by either chemical or biological agents. The information is very valuable to all of us in trying to plan the appropriate policies to make sure the people of our Country remain healthy.

So my question is, I am not confident that we have the right system in place for statistical information for non-infectious diseases and to try to evaluate the impacts of global climate change. I would just like to get your assessment as to whether we should be more attentive to try to be more sophisticated in the information we get from our State and county health departments.

Ms. COOPER. I think it is a great question. Certainly, surveillance is a very important part of the work that State public health departments do. These increases in the extreme events, whether it is heat-related, cold, and when we see hurricanes, floods and what not, we have pretty good warning systems that things are about to happen. But we don't necessarily have all of the systems in place to look at in detail the downstream effects of the climate event.

We can look at them individually, but it would be nice if we could really bolster this surveillance system and bolster the research needed to put policies in place that are scientifically based. This is a new world for us. As you said, the world certainly changed on 9/11. This, for me, is a part of our emergency preparedness planing infrastructure. It is just one more column, if you will, of threats to the citizens of our State.

Certainly, we would encourage that we find ways to fund systems that really help us with our planning, with our surveillance initiatives, and also with event responses. It is nice to be able to share success stories across States.

Senator CARDIN. Thank you for that response. We want science-based information. I think that listening to the testimony of all three of the witnesses on this panel, I would welcome suggestions as to how the Congress can encourage that type of information coming out of our States and counties so that we can make the right type of science-based decisions. That is what we want to do.

So I just think we haven't really given this as much thought as we need to give, and I would appreciate you being on the front line, perhaps making some suggestions where we could be helpful as a partner to encourage that type of collection and warning system throughout our Country.

Thank you very much, Madam Chair.

Senator BOXER. Thank you.

Senator Whitehouse.

Senator WHITEHOUSE. Thank you, Madam Chair.

Commissioner Cooper, I am interested in the position statement on public health and climate change that has recently been adopted by the Association of State and Territorial Health Officials. I have not seen that yet. Is it generally consistent with what we have been reading about from the International Panel on Climate Change?

Ms. COOPER. Yes, sir. It is consistent with that, and it is also consistent with the policy and position statements of the Centers for Disease Control and the National Governors Association, because the report really stresses that the weight of the evidence demonstrates that human factors have and will continue to contribute significantly to changing the world's climate. We support that. We believe that.

Senator WHITEHOUSE. And you were able to get that? Was there a minority report?

Ms. COOPER. This position statement passed unanimously by the State and territorial health officers.

Senator WHITEHOUSE. Unanimously, including the State health officers from Wyoming and Oklahoma?

Ms. COOPER. It passed unanimously.

Senator WHITEHOUSE. Well, I would like to find out how you managed to do that because there is a marked contrast between, Madam Chair, the unanimity of the trained health professionals in every single State in the Country, who can get together and just weeks ago come out with a unanimous statement, and the dialogue that still persists in the Senate chamber on this subject. I don't know if, Commissioner Cooper, you would care to offer an explanation as to how it is that your group manages to find unanimity on this issue, and we find even consensus difficult to achieve.

Ms. COOPER. I believe we try to focus on what our roles are as State health officers. We truly, again, will stand to protect the health of the public, promote health, and improve health. If you can agree that those three things are important, and you look for policies that support moving in that direction. I think that grounding in that, instead of looking at our differences, we looked at our similarities. We looked at what was good for the citizens of our State, and I believe that was one of the driving factors.

Senator WHITEHOUSE. Well, I am impressed that it was unanimous, and I appreciate your efforts. I thank you for your testimony.

Madam Chair.

Senator BOXER. Thank you very much.

Of course, Senator Whitehouse, we are so behind, not only the public health community, and there are exceptions, one noted at the table. But we are so far behind. Remember, there are still people who said HIV doesn't cause AIDS and tobacco doesn't cause cancer. You are never going to have unanimity, but basically there is as close to unanimity as we can get among the scientists, and among the doctors. And yet it is so elusive here in the United States Senate, but we are going to of course try to challenge that in this Committee.

I would ask unanimous consent to place into the record a letter we received, dated October 22, from the American Public Health Association. It says, "We want to make it clear that climate change is a public health issue, from changes in vector-borne diseases to impacts on drinking water supply, to extreme weather events. We are already seeing the effects of climate change on health across the globe." So we are going to put that letter in the record.

[The referenced document follows on page 57.]

Senator BOXER. And then we have the National Association of County and City Health Officials. A lot of my colleagues on the other side of the aisle say let the States and local people take the lead. Well, here is what they say: "The National Association of County and City Health Officials believes that climate change has serious far-reaching health implications for this and future generations." And they say that the health departments have to address these impacts.

[The referenced document follows on page 59.]

Senator BOXER. And then the World Health Organization, they say they have carried out both qualitative reviews and quantitative assessments of the health risks posed by climate change. The organization concluded that the health hazards posed by climate change are significant, wide-ranging, distributed throughout the globe, and difficult to reverse.

[The referenced document follows on page 61.]

Senator BOXER. So I would just call on my colleagues to heed the people who are the healers in this world and in this Country, and get off your duff and support good legislation and let's get it going now.

Senator WHITEHOUSE. Madam Chair?

Senator BOXER. Yes, I would yield to you.

Senator WHITEHOUSE. I just wanted to ask if the Association of State and Territorial Health Officials' position statement on climate change and public health is in the record of this hearing?

Senator BOXER. I would like you to add that to what we just put in the record.

Senator WHITEHOUSE. Okay. May I ask unanimous consent to make it part of the record?

Senator BOXER. Yes.

[The referenced document follows on page 65.]

Senator BOXER. Absolutely. Would you like to quote from a couple of sentences from it?

Senator WHITEHOUSE. It is all good. I would start reading it and I would go all the way through.

[Laughter.]

Senator BOXER. All right, Senator.

I just want to thank our panel very, very much. Again, we are making a record here in this Committee, a record that we think must not be ignored by colleagues from both sides of the aisle and by the American people.

Thank you.

We stand adjourned.

[Whereupon, at 11:20 a.m. the committee was adjourned.]

[Additional material submitted for the record follows.]

American Public Health Association
Working for a Healthier World
800 I Street, NW • Washington, DC 20001-3710
(202) 777-APHA • Fax: (202) 777-2534 • comments@apha.org • www.apha.org

October 22, 2007

The Honorable Barbara Boxer
Chairman
U.S. Senate Committee on Environment and Public Works
410 Dirksen Senate Office Bldg.
Washington, DC 20510-6175

Dear Chairman Boxer:

The American Public Health Association (APHA) is the oldest and most diverse organization of public health professionals in the world, dedicated to protecting all Americans and their communities from preventable, serious health threats and assuring community-based health promotion and disease prevention activities and preventive health services are universally accessible in the United States. I write on behalf of APHA to express strong support for your efforts to highlight the potential and likely public health effects of global climate change.

First off, I want to make it clear that climate change is a public health issue. From changes in vector borne diseases to impacts on drinking water supply to extreme weather events, we are already seeing the effects of climate change on the health across the globe. According to the World Health Organization, deaths from extreme heat, air pollution and infectious diseases are already occurring around the world. The public health community must be involved in every effort to not only mitigate the negative health effects of climate change, but also to adapt to those changes that are already occurring.

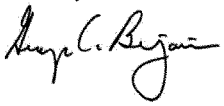
We must also note that the world's most vulnerable, those populations who are already at increased risk from death and disease, such as communities of color, the elderly, young children and the poor will face the highest burden of death and disease from climate change. These communities already face poor health conditions – including lack of access to clean air and water and unhealthy living conditions that will be exacerbated by climate change.

APHA believes that the public health community has a critical role to play in advocating for both mitigation of climate change and adaptation to the negative public health effects that will result. But we must also ensure that our nation's public health workforce is educated about the impacts of global climate change. We believe that legislative proposals to address climate change should address both mitigation and the negative health consequences that are already taking place. Any legislation should support alternative energy use and decreased emissions and also healthy community design. Decreasing Americans' reliance on cars by creating more walkable and bikeable communities will decrease greenhouse gases and also has other health benefits, including decreased asthma rates and reduced obesity. We also

strongly support efforts to provide our already over extended local, state and federal public health workers and agencies with the training and increased resources they will surely need to be able to address the public health challenges created by global climate change.

Thank you again for your leadership on this critical public health issue. We look forward to working with you and your colleagues to ensure that the public health consequences of climate change are at the forefront of your discussions as you move forward in developing legislation to address this unique challenge. Please don't hesitate to contact APHA if we can be of any assistance in that process.

Sincerely,



Georges C. Benjamin, MD, FACP, FACEP (Emeritus)
Executive Director

October 23, 2007

The Honorable Barbara Boxer
Chairman, Senate Environment and Public Works Committee
456 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Boxer:

Thank you for holding a hearing October 23 on the human health impacts of global warming. The National Association of County and City Health Officials (NACCHO) believes that climate change has serious far-reaching health implications for this and future generations. The impacts of climate change are felt first and foremost at the local level and local health departments are working to address these impacts. Many local health officials are educating the public about the health impacts of climate change in order to raise awareness about problems that are already occurring and are expected to worsen if climate change is not addressed.

Environmental changes that can be expected from climate change include: extreme temperatures, extreme weather events and natural disasters, worsened air quality, shortages of food and water, increased vector borne and zoonotic diseases, stratospheric ozone depletion and social and economic impacts on community health and well-being.

Health impacts are associated with many of these environmental changes. Temperature extremes can cause cold and heat-related illnesses and deaths, which are disproportionately felt by vulnerable populations. As seen in Hurricane Katrina in 2005, communities can be displaced and their residents suffer death, injury and illness as well as social, emotional and mental health stress as a result of natural disasters. The aftermath of this catastrophic event demonstrated that communities affected by a natural disaster can take years to rebuild after their fragile infrastructure is destroyed.

Other health impacts include increases in chronic diseases such as asthma, allergies and other respiratory illness resulting from increased air pollution. Drought can cause increased concentrations of pollutants and freshwater pathogens in drinking water supplies. Increases in vector borne and zoonotic diseases can produce changed patterns of disease like West Nile Virus with a shorter respite due to colder weather killing off mosquito populations.

Local health officials have a role to play in preparing for and combating the adverse health impacts caused by climate change. These problems will transpire differently in different regions of the country. Local health departments are engaged in monitoring the public's health, investigating infectious water-, food- and vector-borne illnesses and taking steps to reduce the incidence of disease. Since the terrorist attacks of 9/11 and the anthrax attacks following soon after, local health departments have taken on the role of public health emergency

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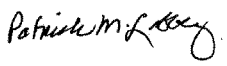
preparedness in a more focused way. Local health departments are preparing their employees and communities to respond to all hazards, including natural disasters resulting from global climate change.

In a natural disaster, local health officials work with local emergency management officials and other community leaders to make sure that public health concerns are addressed and the public's health is protected. Local health departments are currently conducting exercises and drills so that they will be prepared in any emergency, be it bioterrorism, a hurricane, flood or earthquake or an infectious disease like pandemic influenza. In an emergency, all public health personnel will be called upon, regardless of their usual day-to-day responsibilities. This means that in an emergency that lasts for an extended period of time, local public health staff may not be able to attend to their normal duties in the area of chronic or infectious disease, maternal and child health, immunizations or other public health services. This would have an immediate impact on the community as levels of immunization and other preventive services decrease and chronic and infectious disease rates rise.

In closing, local health departments are acutely aware of the health impacts of climate change and are actively preparing for these health impacts and monitoring changes in chronic and infectious disease that are expected to increase in the coming years. We thank you again for your leadership on this issue and look forward to working with you to address the pressing needs of local communities.

Sincerely,



Patrick M. Libbey
Executive Director

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In reply please refer to: PHE- H11/372/48

Your reference:

The Honourable Barbara Boxer
Chairman
Committee on Environment and Public Works
United States Senate
410 Senate Dirksen Office Building
Washington, DC 20510-2602
USA

22 October 2007

Madam,

I have the honour to respond to an enquiry from your staff related to the latest consultations and information within the international health community and the World Health Organization (WHO) on the subject of public health and climate change, I would like to take the opportunity to brief you on this matter.

Evidence on health risks from climate change.

The WHO has run an active programme on climate change since the late 1980s. Over this period, WHO has produced a wide range of reports reviewing the evidence that climate change poses to health, and has an increasing focus on providing guidance to member states on protection from these risks.

The WHO position on the science of climate change is as described by the Intergovernmental Panel on Climate Change (IPCC); i.e. that the earth is warming, with more extreme events (such as heat waves, floods and droughts), that human actions are the dominant cause of these changes, and that these trends will continue throughout the next Century.

WHO has carried out both qualitative reviews and quantitative assessments of the health risks posed by climate change. The organization concludes that the health hazards posed by climate change are significant, wide-ranging, distributed throughout the globe, and difficult to reverse. The climate change that has occurred so far is already having health impacts, for example influencing the European heat wave of 2003 which killed over 35,000 people, and facilitating conditions for malaria epidemics in the East African highlands. Climate change affects some of the most important risk factors for global public health, such as the availability of freshwater, and some of the largest disease burdens, particularly those of childhood, such as malnutrition, diarrhoea and malaria.

cc: Permanent Mission of the United States of America to the United Nations Office and other International Organizations in Geneva

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Although all populations are vulnerable, the greatest risks are to populations living in small-island developing states, mountain regions, water-stressed regions, mega cities in developing countries (particularly the Asian mega-delta cities), and those that are poor, and poorly protected by health services. The greatest concern is for Africa, which has the highest burden of climate-sensitive diseases, the weakest public health capacity to respond to the additional impact, and where climatic effects on socioeconomic development will have the largest impact on health and wellbeing.

Climate change is expected to bring some health benefits (some reduction in winter deaths in elderly populations in high latitudes), but these are outweighed by the negative impacts, both now and for the foreseeable future. A WHO quantitative assessment concluded that even the modest degree of climate change that has occurred since the mid 1970s may already have been causing over 150,000 excess deaths annually by the year 2000. The burden is overwhelmingly concentrated on diseases of children in poorer countries; i.e. those who have contributed least to the causes of climate change.

Compared to the developing world, the US population is expected to be protected from many of the health risks of climate change, due to generally high socioeconomic standards, and effective public systems. These should ensure, for example, that endemic malaria does not return to the USA. However, significant risks remain, particularly through an increasing frequency and intensity of weather-related natural disasters such as heat waves, bushfires and hurricanes, water scarcity affecting infectious diseases, and potentially loss of livelihoods. These risks can be expected to be most severe among those who are living in poor socioeconomic conditions, have pre-existing disease conditions, and/or lack of access to healthcare and other support services.

The US population may also be put at risk through the health effects of climate change outside US borders. These include increasing infectious disease and other health risks for US travellers and immigrants, potential geopolitical instability arising from increased risks of conflict over dwindling natural resources, and increased numbers of refugees displaced by drought or flooding.

Climate change also threatens to undermine the effectiveness of US support to health goals in the developing world, by increasing the risks of climate-sensitive diseases and conditions such as malaria, diarrhoea and malnutrition in Africa, and by reducing the effectiveness of support in sectors such as water supply and agriculture.

The need for an effective response:

WHO has concluded that climate change brings major new challenges to health security, and will increase the costs and difficulties of disease control. As the evidence for climate change and associated health impacts has increased, WHO is receiving increased requests for guidance and assistance from its member states, through the WHO Regional Committee meetings. Humanitarian agencies such as the International Federation of the Red Cross and Red Crescent are recording a rapidly increasing demand for operational support to weather-related natural disasters, such as the recent extreme floods in India and across central Africa.

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A well planned approach by the international community could minimize these damages, and bring both immediate and long-term gains for public health. Any effective response to protect health from climate change will need to include both adaptation, to protect health from the climate change that is now inevitable, and climate change mitigation, in order to slow and eventually to halt the increase in health hazards.

Because some climate change is now inevitable, it will be necessary to strengthen health systems to protect public health from the associated risks. Most of the impact will be from exacerbations of existing problems. In the view of WHO, the most effective response will be mainly through strengthening core public health interventions, based within existing health systems, rather than either setting up parallel functions that are specific to climate change, and that could distract attention and resources from these essential activities.

This strengthening should include a greater emphasis on environmental and socioeconomic determinants of health risks (such as disaster risk reduction), and actions specifically within the formal health sector, such as enhanced environmental health protection, strengthened disease surveillance and response, and improved health action in crises. These can be supported by selected "new" interventions for specific risks, such as heat wave and vector-borne diseases early warning systems, and supporting development choices that enhance health in related sectors such as agriculture and water management. All of these actions would benefit health now, as well as reducing vulnerability to future climate change.

For long-term health protection, it will also be necessary to reduce climate change itself, mainly by cutting greenhouse gas emissions. This will also create opportunities for immediate health gains. For example, the use of cleaner energy sources would reduce deaths from indoor and outdoor air pollution, and promotion of sustainable transport systems and urban development could reduce the rapidly growing disease burden related to physical inactivity. The IPCC concludes that even a conservative accounting of the health benefits (considering only air pollution) would largely offset the investment costs necessary to reduce greenhouse gas emissions.

Opportunities for enhanced health protection from climate change in the USA and internationally:

In response both to the accumulating scientific evidence and the demands of member states, WHO has recently stepped up its activities on health protection from climate change, including increasing its capacity-building activities across member states. WHO is developing a *Global Framework on Health Protection from Climate Change*, recently highlighted and supported by the Spanish Prime Minister at the UN High Level Meeting on Climate Change on 24th September 2007. WHO has announced that "Health Protection from Climate Change" will be the theme of the World Health Day 2008, and the WHO 60th anniversary year. It will therefore be a focus for awareness raising and increased activity on this issue across the international health community.

WHO already works closely with US agencies, notably the US Centers for Disease Control and Prevention, and the US Environmental Protection Agency. WHO proposes to maintain and enhance this technical collaboration, for example through consultation during the further development of the *Global Framework on Health Protection from Climate Change*, and sharing of expertise. This would strengthen the international effort on this issue, through better

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access to US expertise to address global health threats. It should also contribute to US goals, such as reduction of risks of disease and geopolitical threats from abroad, and enhancement of the effectiveness and the visibility of US international aid for health and development.

If you, Madam Chairman, or the Senate Committee on Environment and Public Works would like a briefing in person at some point in the future on these or other subjects related to world health, please do not hesitate to contact me or my colleague, Dr Nelle Temple Brown, in the WHO Liaison Office in Washington, DC (templebrownn@who.int, 202-974-3299).

Please accept, Madam, the assurance of my highest consideration.

Dr David L. Heymann
Assistant Director-General for
Communicable Diseases, and
Representative of the Director-General for
Polio Eradication

ASTHO Position Statement- Climate Change and Public Health

I. CLIMATE CHANGE AND PUBLIC HEALTH

There is widespread scientific consensus that the world's climate is changing. The Association of State and Territorial Health Officials (ASTHO) supports the scientific consensus put forward within the Intergovernmental Panel on Climate Change Fourth Assessment Report that the weight of evidence demonstrates that anthropogenic factors have and will continue to contribute significantly to changing the world's climate. The anticipated health effects related to climate change include death and illness from heat waves, injuries from catastrophic weather events, increased air pollution with concomitant rises in respiratory and cardiovascular diseases, and an increased incidence of vector- and water-borne diseases. Recent climate-related challenges, from extreme weather events to changing patterns of communicable disease, have already demonstrated the critical need to improve public health capacity to identify, prevent, and respond to climate related threats.

A. ASTHO recognizes that climate change has serious far-reaching implications for the health of this and future generations.
B. ASTHO asserts that climate change has the potential to place unprecedented demands upon public health infrastructure in the United States and abroad.
C. ASTHO asserts the need for enhanced and specific preparedness of federal, state, and local health systems to cope with the present and future challenges of climate change.
D. ASTHO acknowledges that there are uncertainties regarding the projected impacts of climate change on health.
E. The actual effects of climate change on population health are influenced by many confounding factors, including socioeconomic status of individuals and communities, demographic structure of the population, geographical location, access to medical care, and adaptation measures implemented to reduce negative impacts. Recognizing these uncertainties, ASTHO supports action to adequately bolster public health infrastructure to prepare for future challenges.

II. ASTHO SUPPORTED RESPONSE TO CLIMATE CHANGE

ASTHO advocates strong coordination and collaboration across all tiers of governmental public health to improve understanding of climate change and enable optimal preparation and response to related health impacts.

A. ASTHO urges federal, state and local government bodies, including legislatures, to provide leadership in the development and coordination of public health policy and reform of existing policies, to address health impacts related to climate change.

III. UNDERSTANDING AND PREPAREDNESS

ASTHO supports enhancing the ability of federal, state and local health agencies to understand and prepare for the health impacts linked to climate change in their jurisdictions.

A. ASTHO urges the federal government to provide leadership, resources, and programs to support state health agencies in developing educational initiatives to raise awareness of the link between climate change and human health among public health professionals and prepare for the potential health impacts of climate change with enhanced planning, surveillance initiatives, and programs.
B. ASTHO supports investment in research to better understand the potential health impacts of climate change and to develop and enhance surveillance and response systems to mitigate health impacts.
C. Efforts should include, but not be limited to, initiating and promoting scientifically based health programs; developing practice standards; identifying promising practices and success stories; developing decision support systems that enable agencies to predict, anticipate, and model events; and developing early warning systems that enable rapid response.

IV. EDUCATION AND OUTREACH

ASTHO urges public health agencies and professionals to inform communities, policy makers, other government departments and industry of the public health impacts of climate change. Public health leaders must be at the forefront of all mitigation and adaptation actions related to climate change.

A. ASTHO encourages public health agencies and professionals to actively engage with all stakeholders to insure consideration of the potential health impacts in all aspects of behavior, consumption, and decision making that may contribute to climate change.

B. ASTHO urges public health agencies and professionals to actively promulgate policies towards preventing and mitigating the public health impacts of climatic change.

REFERENCE

1. Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report. Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability. April 6th, 2007.

Approval History:

Environmental Health Policy Committee Review August 6, 2007
Executive Committee Review and Approval on October 2, 2007 (pending)
Position Expires on October 2, 2010.

ASTHO policies are broad statements of enduring principles related to particular policy areas that are used to guide ASTHO's actions and external communications.